

Copepods (Crustacea) Associated with Marine Invertebrates from Great Barrier Reef, Australia

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ABSTRACT

Seven new species of copepods associated with marine invertebrates are described from the Great Barrier Reef, Australia. They are *Panjakus bidentis* from the scleractinian *Pocillopora verrucosa* (Ellis and Solander), *Scyphuliger humesi*, *S. vicinus* and *S. placidus* from the scleractinian *Acropora squarrosa* (Ehrenberg), *Doridicola parapatulus* from the nudibranch *Glossodoris atromarginata* (Cuvier), *Ruhtra germinata* from an unidentified alcyonacean coral, and *Collocheres oribullatus* from the crinoid *Comanthina belli* (Carpenter).

Key words: Copepoda, association, Great Barrier Reef, *Panjakus*, *Scyphuliger*, *Doridicola*, *Ruhtra*, *Collocheres*

INTRODUCTION

The Great Barrier Reef, Australia is generally well known for its vast area and the great diversity of scleractinian corals and other marine invertebrates. Humes (1991) listed 29 species of previously known copepods associated with the scleractinian corals from the Great Barrier Reef and added nine new species associated with the scleractinian corals from the same area. He mentioned that many other copepod associates of the corals would be discovered from this region. Although it is generally known that the coral community contains very diverse other invertebrates, very few

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copepods associated with the invertebrates have been reported from the Great Barrier Reef.

While examining the copepod collection of the late Dr. Arthur G. Humes that he collected from the Great Barrier Reef, the author have become to aware that he left some untouched copepod samples. These copepod samples include the following seven new species which are to be described in the present report.

Order Cyclopoida

Family Anchimolgidae

Panjakus bidentis n. sp. from the scleractinian *Pocillopora verrucosa* (Ellis and Solander).

Scyphuliger humesi n. sp. from *Acropora squarrosa* (Ehrenberg).

Scyphuliger vicinus n. sp. from *Acropora squarrosa* (Ehrenberg).

Scyphuliger placidus n. sp. from *Acropora squarrosa* (Ehrenberg).

Family Rhynchomolgidae

Doridicola parapatulus n. sp. from the nudibranch *Glossodoris atromarginata* (Cuvier).

Family uncertain

Ruhtra germinata n. sp. from an unidentified alcyonacean coral.

Order Siphonostomatoida

Family Asterocheridae

Collocheres oribullatus n. sp. from the crinoid *Comanthina belli* (Carpenter).

SYSTEMATIC ACCOUNTS

Order Cyclopoida

Family Anchimolgidae Humes and Boxshall, 1976

Genus *Panjakus* Humes and Stock, 1972

***Panjakus bidentis* n. sp. (Figs. 1-3)**

Material examined. 3 ♀♀, 1 ♂ from *Pocillopora verrucosa* (Ellis and Solander), in 2 m, Mermaid Cove, Lizard Island (14° 38'S, 145° 24'E), Great Barrier Reef, Australia, November 1982, collected by A. G. Humes (collected together with 2 ♀♀ of *Pajakus nekopinus* Humes, 1995 and 1 ♀, 1 ♂ of *Juxtandrianellus probus* Humes, 1995). Holotype (♀), allotype (♂; antennule, antenna, maxilliped and legs 1-5 of right side dissected out), and paratype (1 ♀) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington D. C. Dissected paratype (1 ♀) is retained in the collection of the author.

Female. Body (Fig. 1A) moderately narrow. Length 1.79 mm. Prosoma 924 µm long. Cephalothorax 580 × 520 µm, with obscure, incomplete dorsal suture line as junction of cephalosome and first pedigerous somite. Urosome (Fig. 1B) 5-segmented. Fifth pedigerous somite 280 µm wide, wider than genital double-somite. Genital double-somite 250 × 265 µm, anteriorly expanded laterally and becoming narrow posteriorly. Genital areas located dorsally. Three abdominal somites from anterior to posterior 130 × 135, 125 × 112, and 140 × 104 µm. Caudal ramus (Fig. 1C) elongate, 77 × 15 µm, ratio 5.13 : 1, slightly narrowed distally; 6 caudal setae smooth, longest one of them 52 µm at most. Egg sac not seen.

Rostrum longer than wide, with club-shaped posterior process (Fig. 1D). Antennule (Fig. 1E)

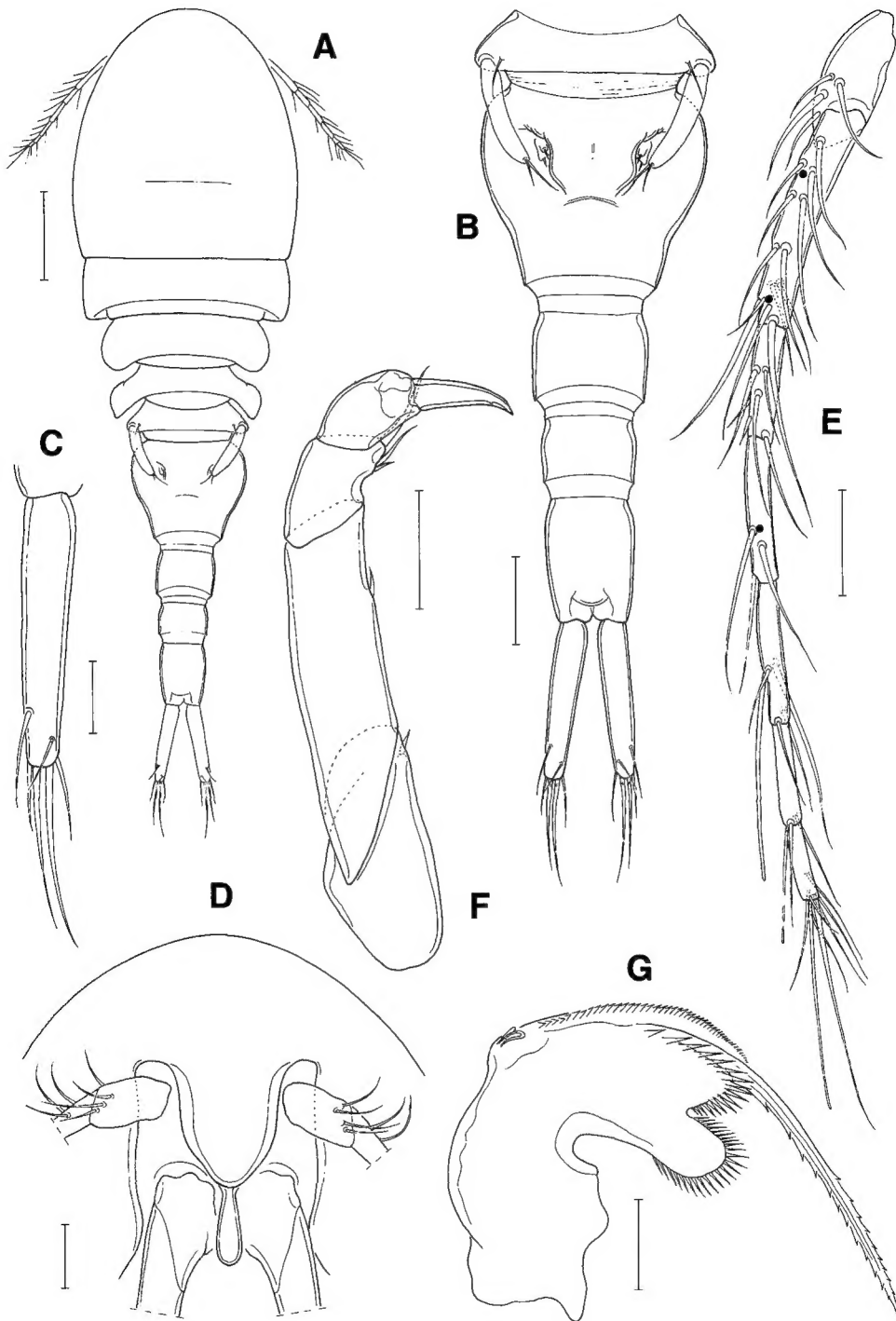


Fig. 1. *Panjakus bidentis* n. sp., female. A, habitus, dorsal; B, urosome, dorsal; C, caudal ramus, dorsal; D, rostral area, ventral; E, antennule; F, antenna; G, mandible. Scales = 0.02 mm (C, G), 0.05 mm (E, F), 0.1 mm (B, D), 0.2 mm (A).

remarkably slender. Armature formula: 4, 13, 6, 3, 4+1 aesthetasc, 2+1 aesthetasc, and 7+1 aesthetasc. All setae smooth. Antenna (Fig. 1F) 4-segmented, each segment from proximal to distal 102, 97, 28, and 68 μm measured along inner margin. First and second segments with minute seta, respectively. Third segment with 3 inner distal setae. Fourth segment unarmed. Terminal claw strong, 44 μm , slightly bent distally.

Labrum (Fig. 2A) with 2 divergent posteroventral lobes margined by hyaline membrane. Mandible (1G) with distinct proximal notch; inner margin clearly bilobed, each lobe bearing spinules; convex margin with a pair of small, rod-like processes and followed by row of small denticles; terminal lash long with serrate margins. Maxillule (Fig. 2B) with 2 terminal and 2 subterminal twisted setae, all of them blunt at tip. Maxilla (Fig. 2C) with broad first segment bearing large, curved process; second segment armed with 3 setae: minute proximal seta, curved anterior seta, and serrate inner seta. Lash long, with spinules along convex margin. Maxilliped (Fig. 2D) with first segment unarmed. Second segment with 2 unequal, blunt setae, both located in middle of inner margin; third segment small, armed distally with 2 unequal, blunt setae, and terminated as acute process bearing 4 or 5 spinules on both sides.

Legs 1-4 with 3-segmented rami except for 2-segmented endopod of leg 4 (Fig. 2E-H). Armature formula as follows:

Leg 1: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 4; enp 0-1; 0-1; I, 5

Leg 2: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 3

Leg 3: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 2

Leg 4: coxa 0-1; basis 1-0; exp I-0; I-1; II, I, 5; enp 0-1; II

Outer seta on basis of leg 1 weakly plumose, but those of legs 2-4 naked. Inner seta on coxa of leg 4 very tiny. Second segment of leg 4 endopod $85 \times 26 \mu\text{m}$, its terminal spines of 50 μm (inner) and 28 μm (outer).

Free segment of leg 5 (Fig. 2I) elongate, smooth, narrowed proximally and distally, $132 \times 32 \mu\text{m}$, ratio 3.77 : 1, with 2 terminal smooth setae of 48 μm and 39 μm respectively. Leg 6 represented by 2 minute spinules in genital area (Fig. 1B).

Male. Body (Fig. 3A) resembling in general form that of female. Length 1.65 mm. Cephalothorax $555 \times 490 \mu\text{m}$. Urosome (Fig. 3B) 6-segmented. Fifth pedigerous somite 218 μm wide and very short. Genital somite $287 \times 280 \mu\text{m}$, with round anterior and posterior corners. Four abdominal somites 70×114 , 88×103 , 67×90 , and $120 \times 85 \mu\text{m}$. Caudal ramus similar to that of female, $179 \times 31 \mu\text{m}$, ratio 5.67 : 1.

Rostrum like that of female. Antennule resembling that of female but 3 aesthetascs added, 2 on second and 1 on fourth segments, as indicated by dots in Fig. 1E. Antenna as in female.

Labrum, mandible, maxillule, and maxilla like those of female. Maxilliped (Fig. 3C) with unarmed first segment. Second segment with 2 dissimilar setae near middle of inner margin, 1 comb-like plate near setae (Fig. 3D), and row of small spinules. Small third segment unarmed. Claw weakly curved, with 2 very unequal proximal setae and terminal hyaline membrane.

Legs 1-4 similar to those of female, but with sexual dimorphism in leg 1. Leg 1 with endopod having armature formula 0-1; 0-1; I, I, 4 (Fig. 3E). Leg 5 with small free segment (Fig. 3B). Leg 6 as posteroventral flap on genital somite bearing 2 small setae (Fig. 3B).

Etymology. The specific name *bidentis*, meaning "having two teeth" in Latin, alludes to the

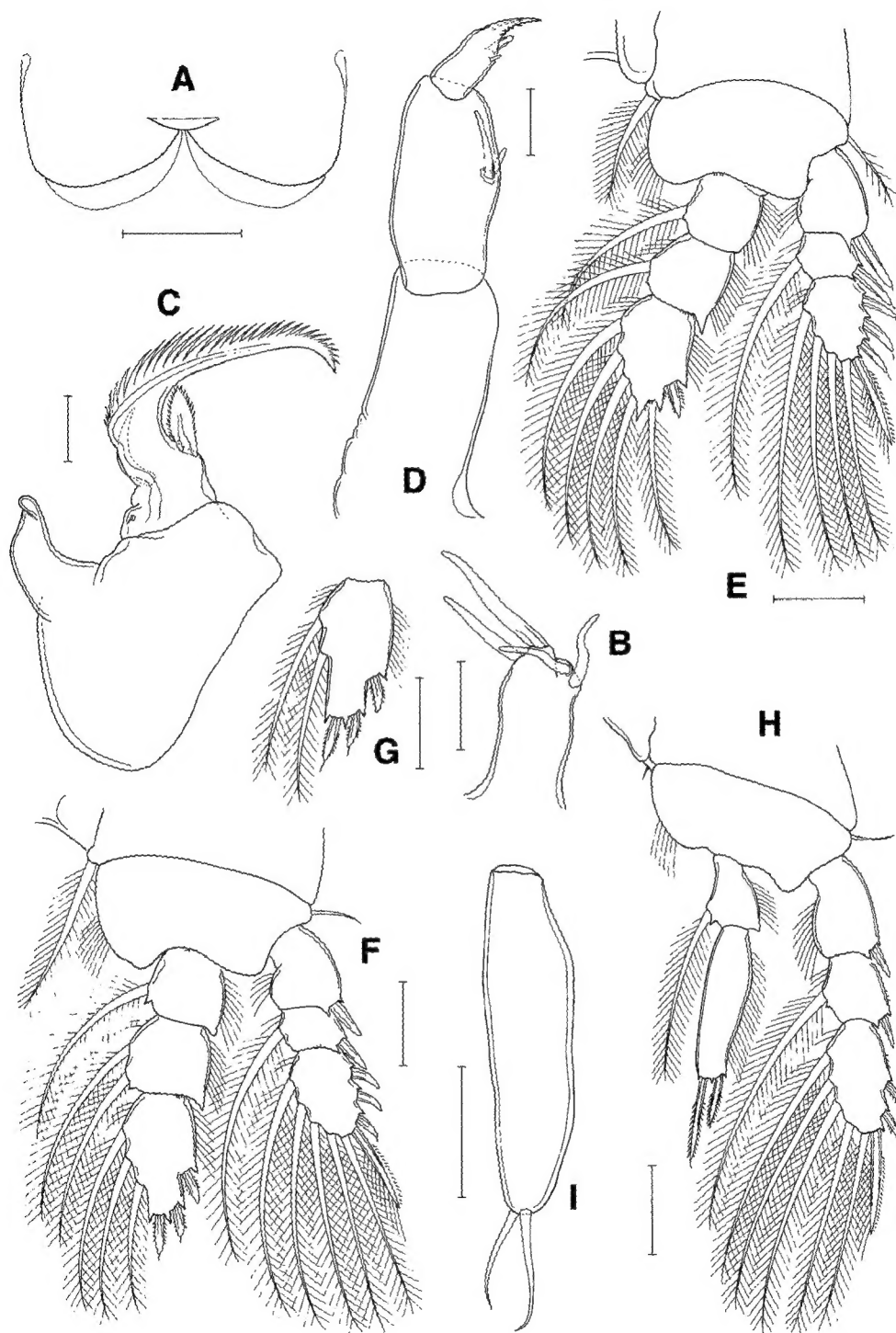


Fig. 2. *Panjakus bidentis* n. sp., female. A, labrum; B, maxillule; C, maxilla; D, maxilliped; E, leg 1; F, leg 2; G, third endopodal segment of leg 3; H, leg 4; I, free segment of leg 5. Scales = 0.02 mm (B-D), 0.05 mm (A, E-I).

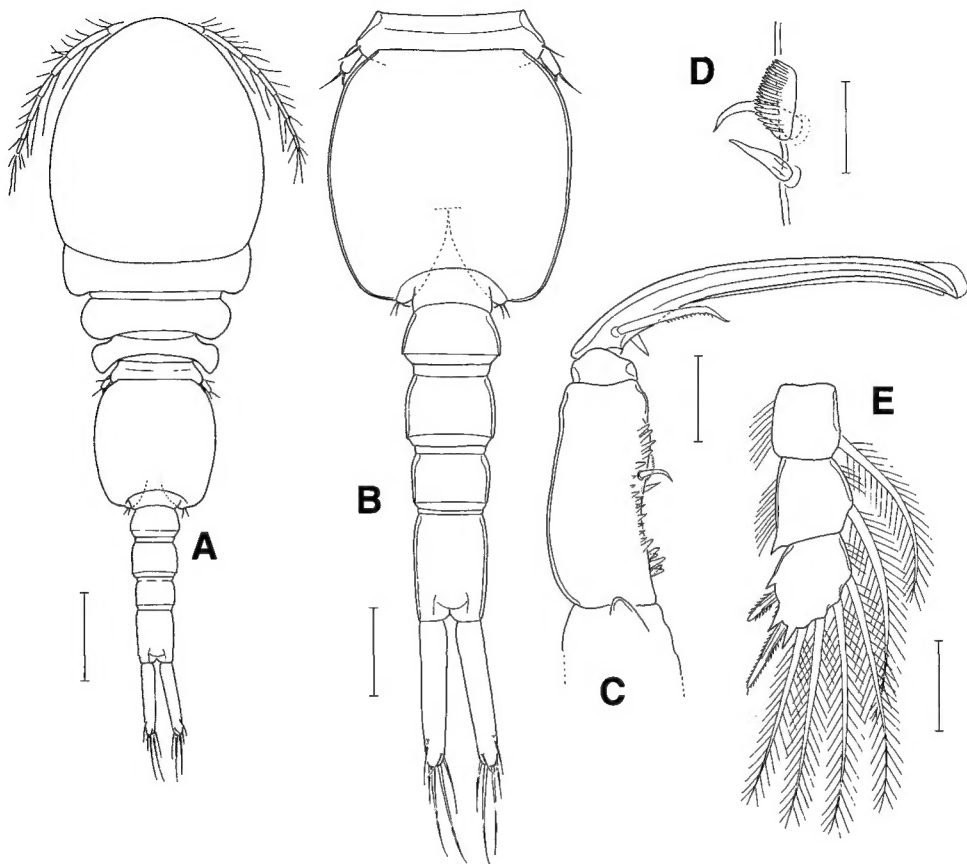


Fig. 3. *Panjakus bidentis* n. sp., male. A, habitus, dorsal; B, urosome, dorsal; C, maxilliped; D, middle portion of second segment of maxilliped; E, endopod of leg 1. Scales = 0.02 mm (D), 0.05 mm (C, E), 0.1 mm (B), 0.2 mm (A).

presence of a pair of dentiform processes on the concave side of mandible.

Remarks. *Panjakus bidentis* can be differentiated from six congeners: from *P. auricularis* Humes and Dojiri, 1979 and *P. necopinus* Humes, 1995 by the possession of nine elements (formula III, I, 5) on the third exopodal segment of leg 3 (II, I, 5 in the latter two species); from *P. eumeces* Humes, 1991 and *P. hydnophorae* Humes and Stock, 1973 by the possession of eight elements (formula II, I, 5) on the third exopodal segment of leg 4 (rather than III, I, 5 in the latter two species); from *P. directus* Humes, 1995 by the shorter caudal rami (ratio 5.13:1, in contrast to 12.4:1 in *P. directus*); and from *P. platygyrae* Humes and Stock, 1973 by the longer free segment of female leg 5, which is 132 μ m long with the ratio 3.77:1, compared to 22 μ m long with the ratio 1.57:1 in *P. platygyrae* (Humes and Stock, 1973).

The presence of a pair of dentiform processes on the convex side of the mandible is a unique feature of *P. bidentis*, because only a single process is reported in five species and none in *P. auricularis*.

Genus *Scyphuliger* Humes, 1991

***Scyphuliger humesi* n. sp. (Figs. 4-6)**

Material examined. 3 ♀♀, 3 ♂♂ from *Acropora squarrosa* (Ehrenberg), in 2 m, Mermaid Cove, Lizard Island, Great Barrier Reef, Australia, 26 October 1982, collected by A. G. Humes. Holotype (♀), allotype (♂), and paratypes (1 ♀, 1 ♂) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Dissected paratypes (1 ♀, 1 ♂) are retained in the collection of the author.

Female. Body (Fig. 4A) with moderately broad prosome and narrow urosome. Length 1.22 mm (in other 2 specimens 1.18 and 1.20 mm). Prosome $641 \times 391 \mu\text{m}$, with parallel lateral margins. First pedigerous somite demarcated from cephalosome by faint dorsal suture line. Urosome (Fig. 4B, C) 5-segmented. Fifth pedigerous somite $200 \mu\text{m}$ wide, distinctly wider than genital double-somite. Genital double-somite $187 \times 125 \mu\text{m}$, constricted in distal one-third. Genital areas located dorsally. Three abdominal somites from anterior to posterior 83×85 , 65×73 , and $95 \times 75 \mu\text{m}$. First abdominal somite narrowed proximally. First abdominal and anal somites with fine sensillae on lateral margins.

Caudal ramus (Fig. 4D) $137 \times 32 \mu\text{m}$, ratio 4.28:1, slightly narrowed distally, with fine sensillae along outer lateral margin and 6 short caudal setae. Outer lateral seta located subterminally. Outer lateral, dorsal and inner one of median terminal setae smooth. Other 3 setae plumose. Longest inner one of median terminal setae $65 \mu\text{m}$. Egg sac not seen.

Rostrum prominent with thick sclerotization along margins (Fig. 4E). Antennule (Fig. 4F) slender and $218 \mu\text{m}$ long. Armature formula: 4, 13, 6, 3, 4+1 aesthetasc, 2+1 aesthetasc, and 7+1 aesthetasc. All setae smooth. Antenna (Fig. 4G) 3-segmented and tapering, each segment 58, 104, and $48 \mu\text{m}$ from proximal to distal. First segment with minute inner distal seta. Second segment with 22 minute, pinnate setules on inner side, but without seta. Third segment unarmed. Terminal claw small, $18 \mu\text{m}$, and curved.

Labrum (Fig. 4I) with 2 posteroventral lobes bearing hyaline membrane along inner side of posterior margin. Mandible (4J) with relatively broad proximal notch; inner margin bilobed, each lobe bearing tuft of long spinules; convex margin with 7 spinules and followed by small denticles; terminal lash elongate with 6 spinules proximally and distinctly serrate margins. Maxillule (Fig. 5A) with 3 unequal terminal setae and 1 subterminal setiform process. Maxilla (Fig. 5B) with first segment bearing about 20 minute, pinnate setules (dots in Fig. 5B indicating remnants of these setules). Second segment having 3 setae; inner seta serrate, enlarged, and fused to segment. Lash with larger spines proximally and followed by minute spinules on convex margin. Maxilliped (Fig. 5C) with first segment unarmed. Second segment with several spinules on outer side and 2 inner setae; larger distal one of these 2 setae approximately twice as long as proximal one; third segment tapering, terminated by acute spiniform process bearing 3 and 4 spinules respectively on each side, with 2 distal setae.

Legs 1-4 with 3-segmented rami except for 2-segmented endopod of leg 4 (Fig. 5D-G). Armature formula as follows:

Leg 1: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 4; enp 0-1; 0-1; I, 5

Leg 2: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 3

Leg 3: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 2

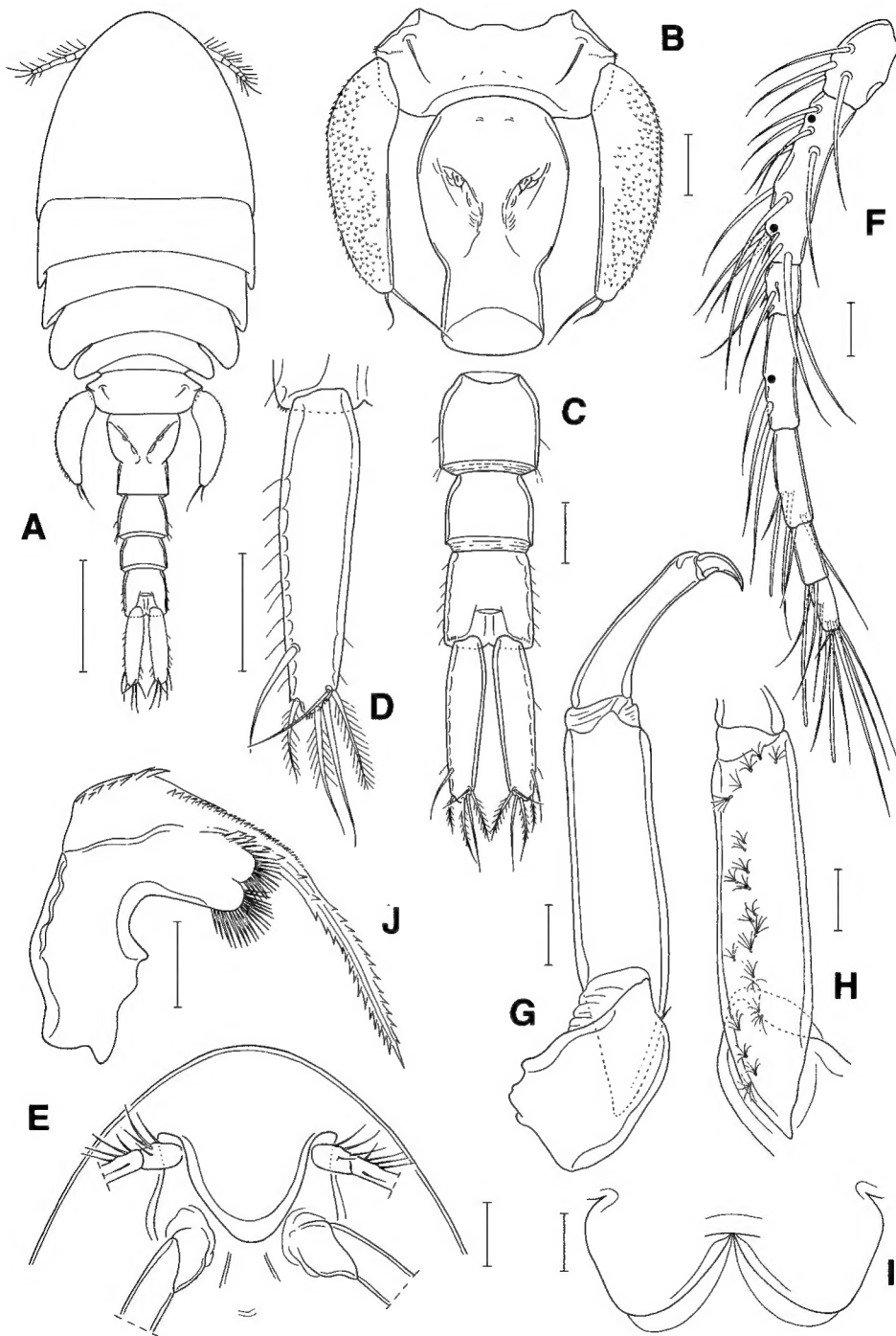


Fig. 4. *Scyphuliger humesi* n. sp., female. A, habitus, dorsal; B, fifth pedigerous somite and genital double-somite, dorsal; C, abdomen, dorsal; D, left caudal ramus, dorsal; E, rostral area, ventral; F, antennule; G, antenna; H, second segment of antenna, inner side; I, labrum; J, mandible. Scales = 0.02 mm (F-J), 0.05 mm (B-E), 0.2 mm (A).

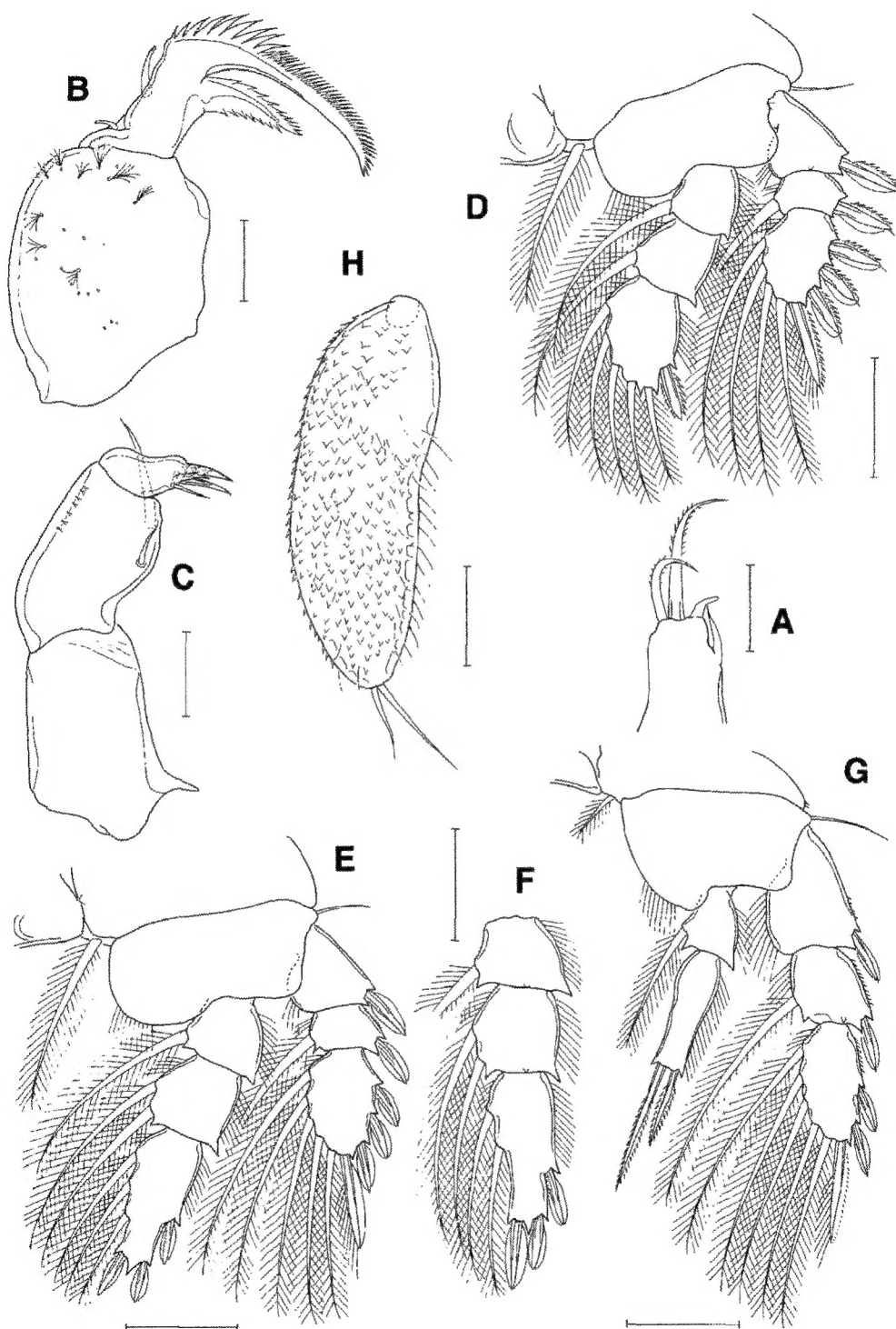


FIG. 5. *Scyphuliger humesi* n. sp., female. A, maxillule; B, maxilla; C, maxilliped; D, leg 1; E, leg 2; F, propod of leg 3; G, leg 4; H, free segment of leg 5. Scales = 0.02 mm (A-C), 0.05 mm (D-H).

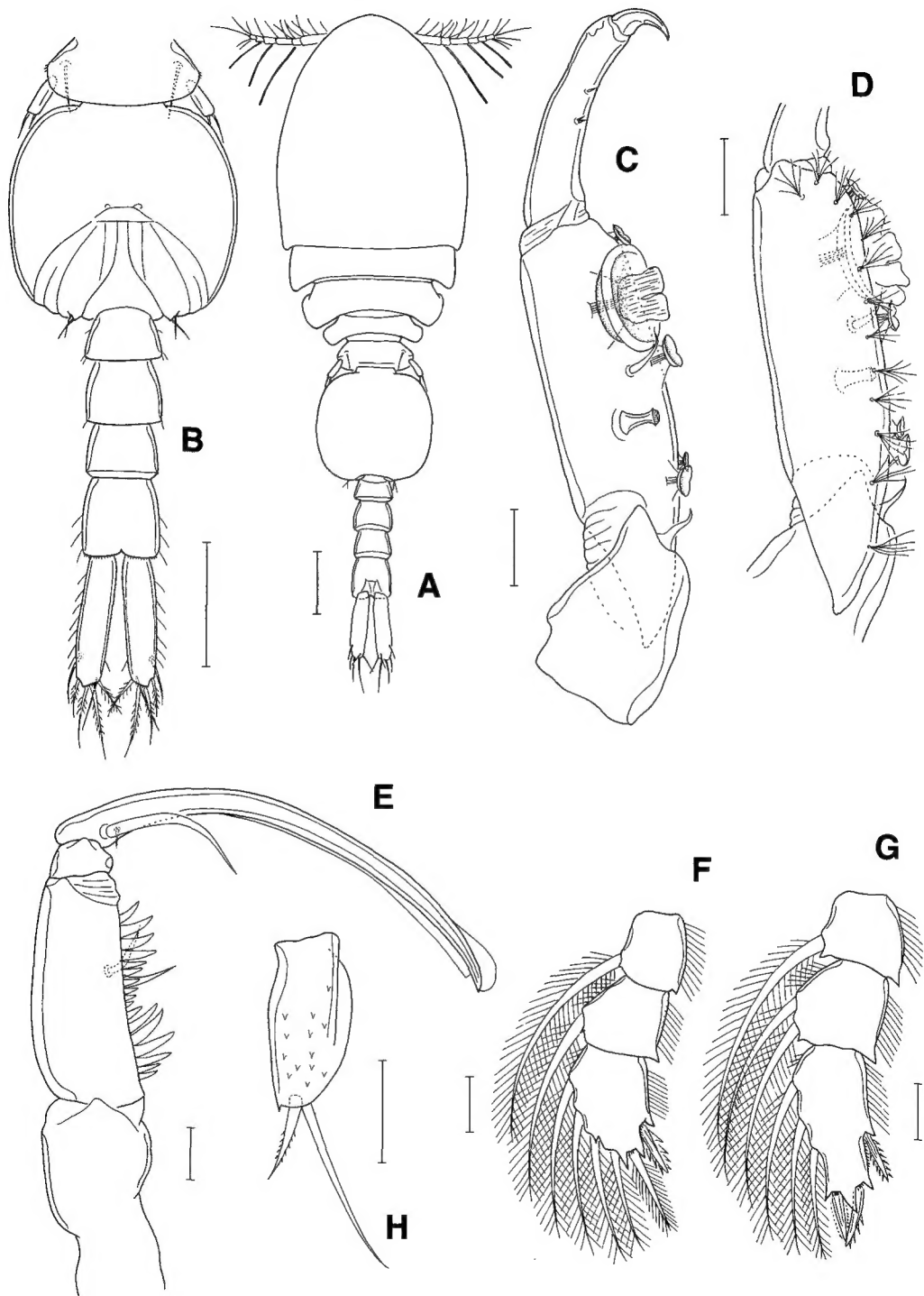


Fig. 6. *Scyphuliger humesi* n. sp., male. A, habitus, dorsal; B, urosome, ventral; C, antenna; D, second segment of antenna; E, maxilliped; F, endopod of leg 1; G, endopod of leg 2; H, free segment of leg 5. Scales = 0.02 mm (C-H), 0.1 mm (A, B).

Leg 4: coxa 0-1; basis 1-0; exp I-0; I-1; II, I, 5; enp 0-1; II

Outer seta on basis of legs 1-4 naked. Second segment of leg 4 endopod $55 \times 19 \mu\text{m}$, with terminal spines of $61 \mu\text{m}$ (inner) and $35 \mu\text{m}$ (outer).

Free segment of leg 5 (Fig. 5H) $195 \times 65 \mu\text{m}$, ratio 3.0:1, with slightly concave inner margin, and numerous minute spinules (or scales) and sensillae; two terminal setae small, each 56 and $36 \mu\text{m}$. Leg 6 represented by 2 minute setae in genital area (Fig. 4B).

Male. Body (Fig. 6A) resembling in general form that of female, but cephalosome and first pedigerous somite fused completely. Length 1.04 mm. Cephalothorax $375 \times 309 \mu\text{m}$. Urosome (Fig. 6B) 6-segmented. Fifth pedigerous somite distinctly narrower than genital somite, $123 \mu\text{m}$ wide. Genital somite nearly semicircular, $177 \times 185 \mu\text{m}$. Four abdominal somites 33×63 , 52×62 , 42×58 , and $64 \times 64 \mu\text{m}$. Anal somite bearing sensillae on lateral margins. Caudal ramus similar to that of female, $104 \times 25 \mu\text{m}$, ratio 4.20:1, with many sensillae on outer lateral margins.

Rostrum like that of female. Antennule resembling that of female but 3 aesthetascs added, 2 on second and 1 on fourth segments, as shown by dots in Fig. 4F. Antenna (Fig. 6C) with first segment having 1 distal inner seta. Second segment with inner seta near middle, 1 large and 4 small suckers, 1 peculiar, peg-like element, and more than 10 pinnate setules (Fig. 6D). Third segment narrow, with 3 minute setae on inner margin. Terminal claw short and strongly curved.

Labrum, mandible, maxillule, and maxilla like those of female. Maxilliped (Fig. 6E) with first segment unarmed and distally expanded. Second segment with 2 similar inner setae and row of spinules (spinules shorter in middle of row). Small third segment unarmed. Claw as long as proximal 3 segments combined, evenly curved, with 2 very unequal proximal setae.

Legs 1-4 with armature formula identical to those of female. Two terminal spines of third endopodal segment of leg 2 convergent distally (Fig. 6G). Leg 5 with free segment (Fig. 6H) widest in middle, $33 \times 16 \mu\text{m}$. Two terminal setae very unequal in size. Leg 6 as posteroventral flap on genital somite bearing 2 small setae (Fig. 6B).

Etymology. This species is named for the late Dr. Arthur G. Humes in recognition of his important contributions to the study of Copepoda.

Remarks. The male antenna of *Scyphuliger humesi* reveals the most outstanding feature of this species. In *Scyphuliger* the second segment of the male antenna usually contains two large and three smaller suckers, except in *S. pucisurculus* Kim, 2003 bearing two larger and two smaller suckers and *S. latus* Kim, 2003 bearing seven tiny suckers. Therefore, the presence of 1 large and 4 smaller suckers plus one peg-like element on the second antennary segment of the male allows this species to be distinguished from all congeners. Although *S. aristoides* Humes, 1993 is not known of its male, this species differs from *S. humesi* in having in the female the shorter distal segment of leg 5 and no constriction in the genital double-somite (Humes, 1993).

***Scyphuliger vicinus* n. sp. (Figs. 7-9)**

Material examined. 6 ♀♀, 1 ♂ from *Acropora squarrosa* (Ehrenberg), in 3 m, Mermaid Cove, Lizard Island, Great Barrier Reef, Australia, 27 October 1982, collected by A. G. Humes. Holotype (♀), allotype (♂, left antenna and left maxilliped dissected out) and paratypes (4 ♀♀) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Dissected paratype (1 ♀) is retained in the collection of the author.

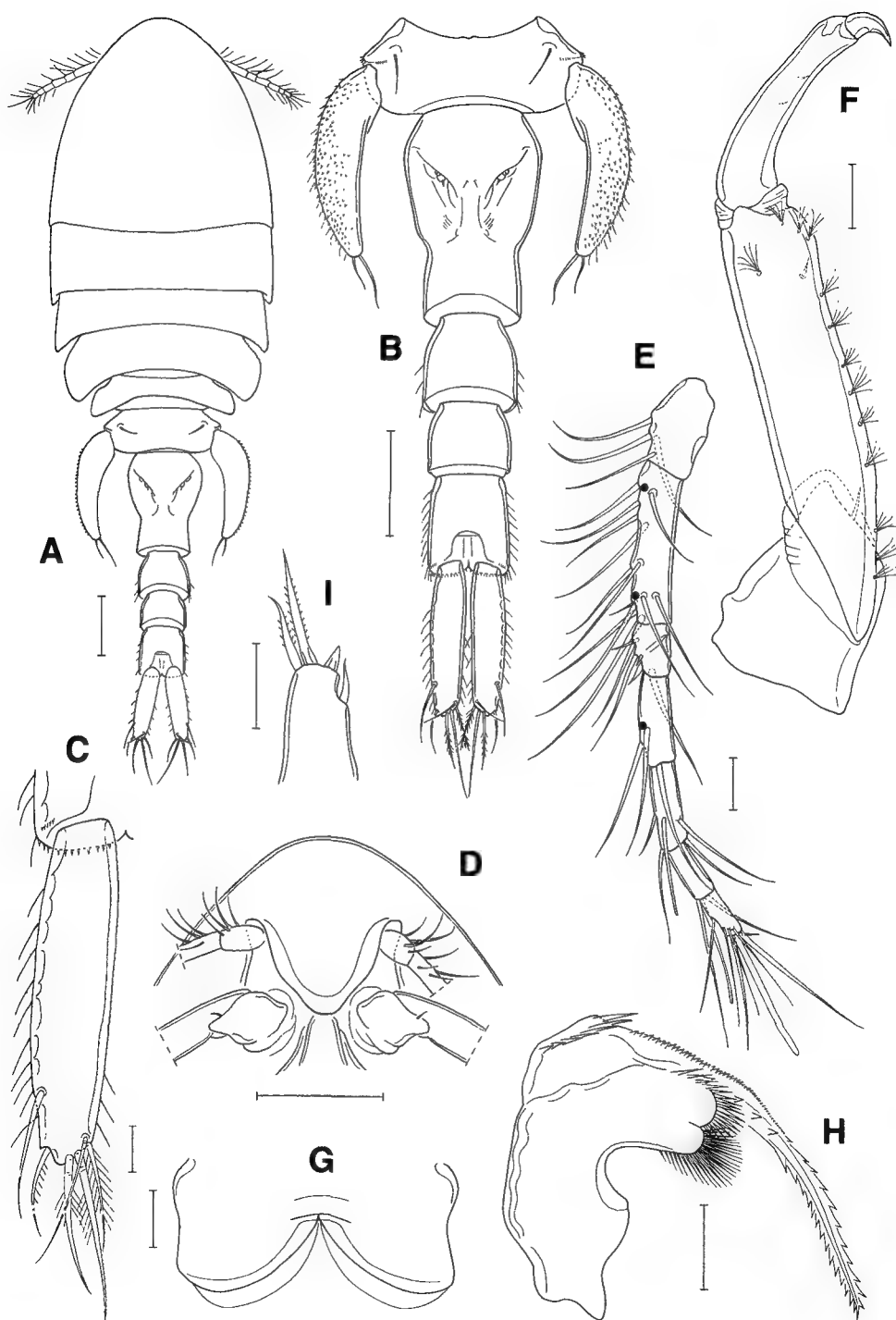
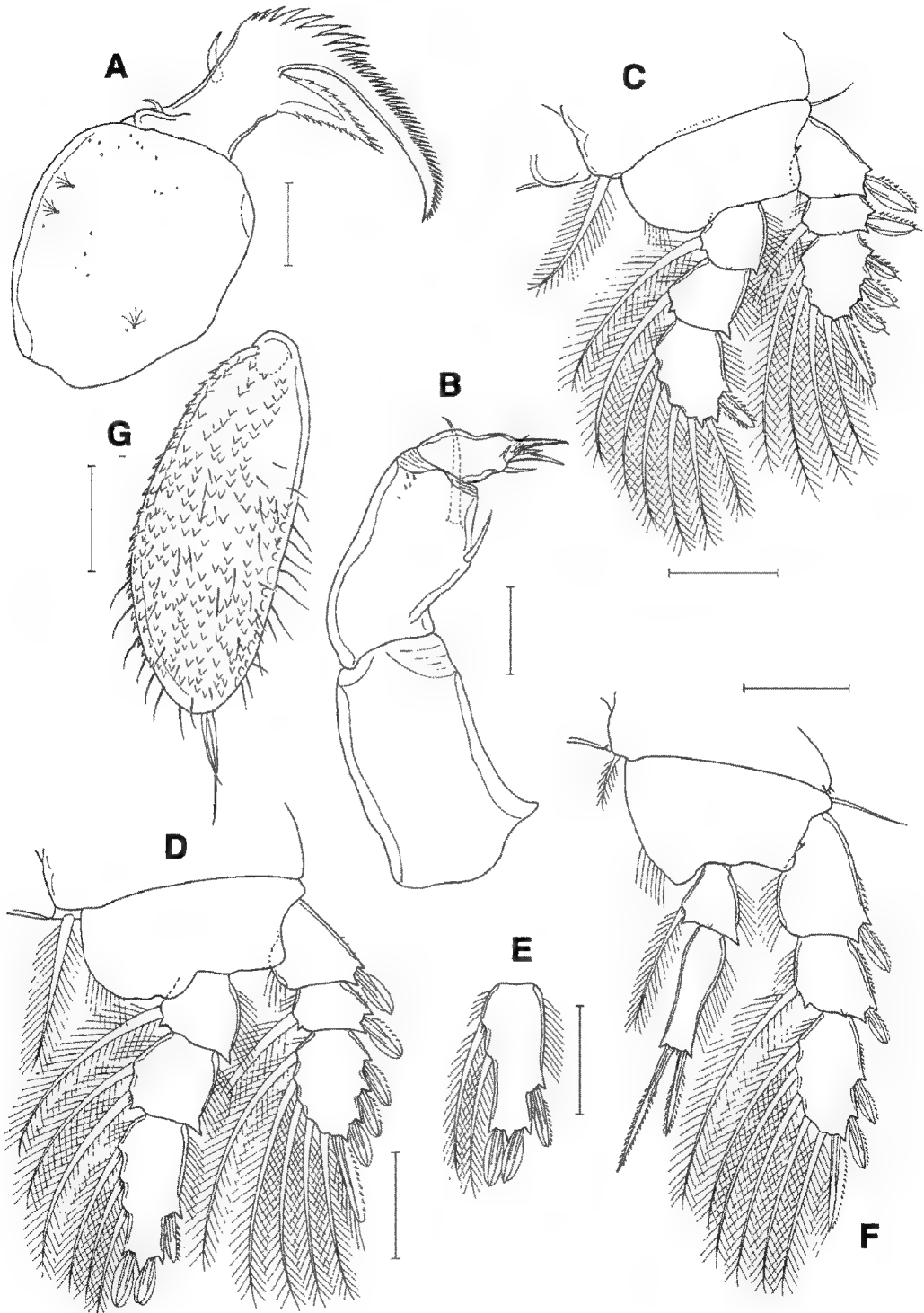


Fig. 7. *Scyphuliger vicinus* n. sp., female. A, habitus, dorsal; B, urosome, dorsal; C, left caudal ramus, dorsal; D, rostral area, ventral; E, antennule; F, antenna; G, labrum; H, mandible; I, maxillule. Scales = 0.02 mm (C, E-I), 0.1 mm (A, B, D).



Cyphuliger vicinus n. sp., female. A, maxilla; B, maxilliped; C, leg 1; D, leg 2; E, third endopodal leg 3; F, leg 4. Scales = 0.02 mm (A, B), 0.05 mm (C-G).

Female. Body (Fig. 7A) with moderately broad prosome and narrow urosome. Length 1.22 mm (1.15–1.23 mm in other 5 specimens). Prosome $654 \times 375 \mu\text{m}$, with nearly parallel lateral margins. First pedigerous somite demarcated from cephalosome by dorsal suture line. Urosome (Fig. 7B) 5-segmented. Fifth pedigerous somite $210 \mu\text{m}$ wide, distinctly wider than genital double-somite. Genital double-somite $192 \times 130 \mu\text{m}$, ratio 1.48:1, with posterior constriction. Dorsal surface of this somite showing indentation. Genital areas located dorsally. Three abdominal somites from anterior to posterior 84×90 , 68×79 , and $95 \times 79 \mu\text{m}$. First abdominal somite distinctly narrowed proximally. First abdominal and anal somites with fine sensillae on lateral margins.

Caudal ramus (Fig. 7C) $148 \times 34 \mu\text{m}$, ratio 4.35:1, weakly tapering in distal part, ornamented with fine sensillae along whole outer margin and distal part of inner lateral margin, with 6 short caudal setae. Outer lateral seta located subterminally. Longest inner one of 2 median terminal setae $72 \mu\text{m}$ at most. Egg sac not seen.

Rostrum with thick posterior sclerotization and distinct posterior contour as in Fig. 7D. Antennule (Fig. 7E) slender and $220 \mu\text{m}$ long. Armature formula: 4, 13, 6, 3, 4+1 aesthetasc, 2+1 aesthetasc, and 7+1 aesthetasc. All setae smooth. Antenna (Fig. 7F) 3-segmented and tapering, each segment 50, 112, and $58 \mu\text{m}$ from proximal to distal. First segment with 1 small distal seta. Second segment with 1 small seta near distal 1/5 of inner margin and more than 10 pinnate setules along inner margin. Third segment narrowed distally with 2 obscure setae on inner margin. Terminal claw small, $15 \mu\text{m}$, and strongly curved.

Labrum (Fig. 7G) with 2 divergent posteroventral lobes margined with hyaline membrane. Mandible (Fig. 7H) with relatively broad proximal notch; inner margin bilobed, each lobe bearing tuft of long spinules; convex margin with about 7 spinules and followed by small denticles; terminal lash moderately long with 4 or 5 spinules proximally and serrate margins. Maxillule (Fig. 7I) with 1 subterminal and 3 terminal seta, one of latter short and spiniform. Maxilla (Fig. 8A) with first segment bearing about 20 minute, pinnate setules (dots in Fig. 8A indicating remnants of these setules). Second segment having 3 setae; inner seta serrate, enlarged, and fused to segment. Lash with larger spines proximally and followed by minute spinules on convex margin. Maxilliped (Fig. 8B) with first segment longest and unarmed. Second segment with 2 setae; larger distal one $25 \mu\text{m}$, and smaller one $14 \mu\text{m}$. Terminal segment terminated by acute spiniform process bearing 4 spinules proximally, with 2 distal setae, larger one of latter spiniform.

Legs 1–4 with 3-segmented rami except for 2-segmented endopod of leg 4 (Figs. 8C–F). Armature formula as follows:

Leg 1: coxa 0–1; basis 1–0; exp I–0; I–1; III, I, 4; enp 0–1; 0–1; I, 5

Leg 2: coxa 0–1; basis 1–0; exp I–0; I–1; III, I, 5; enp 0–1; 0–2; I, II, 3

Leg 3: coxa 0–1; basis 1–0; exp I–0; I–1; III, I, 5; enp 0–1; 0–2; I, II, 2

Leg 4: coxa 0–1; basis 1–0; exp I–0; I–1; II, I, 5; enp 0–1; II

Outer seta on basis of legs 1–4 naked. Second segment of leg 4 endopod $58 \times 19 \mu\text{m}$, with terminal spines of $63 \mu\text{m}$ (inner) and $41 \mu\text{m}$ (outer).

Free segment of leg 5 (Fig. 8G) $183 \times 70 \mu\text{m}$, ratio 2.61:1, distal 1/3 being widest, with nearly straight inner margin, minute spinules (or scales) and sensillae on all surfaces; two terminal setae small, each 54 and $36 \mu\text{m}$. Leg 6 represented by 2 minute setae in genital area (Fig. 7B).

Male. Body (Fig. 9A) resembling in general form that of female, but cephalosome and first

pedigerous somite fused completely. Length 1.10 mm. Cephalothorax $396 \times 338 \mu\text{m}$. Urosome (Fig. 9B) 6-segmented. Fifth pedigerous somite $129 \mu\text{m}$ wide, distinctly narrower than genital somite. Genital somite semicircular, $208 \times 213 \mu\text{m}$. Four abdominal somites 33×68 , 50×69 , 42×60 , and $65 \times 65 \mu\text{m}$. Caudal ramus similar to that of female, $115 \times 27 \mu\text{m}$, ratio 4.26:1, with sensillae on lateral margins.

Rostrum like that of female. Antennule resembling that of female but 3 aesthetascs added, 2 on second and 1 on fourth segments, as shown by dots in Fig. 7E. Antenna (Fig. 9C) with first segment having 1 distal inner seta. Second segment with inner seta near middle, 3 small and 2 large (each placed between small suckers alternately) suckers on inner margin, and more than 10 pinnate setules on lateral surface. Third segment tapering, with 2 minute setae on inner margin. Terminal claw small and curved.

Labrum, mandible, maxillule, and maxilla like those of female. Maxilliped (Fig. 9D) with first segment unarmed and distally expanded. Second segment with 2 similar inner setae, row of

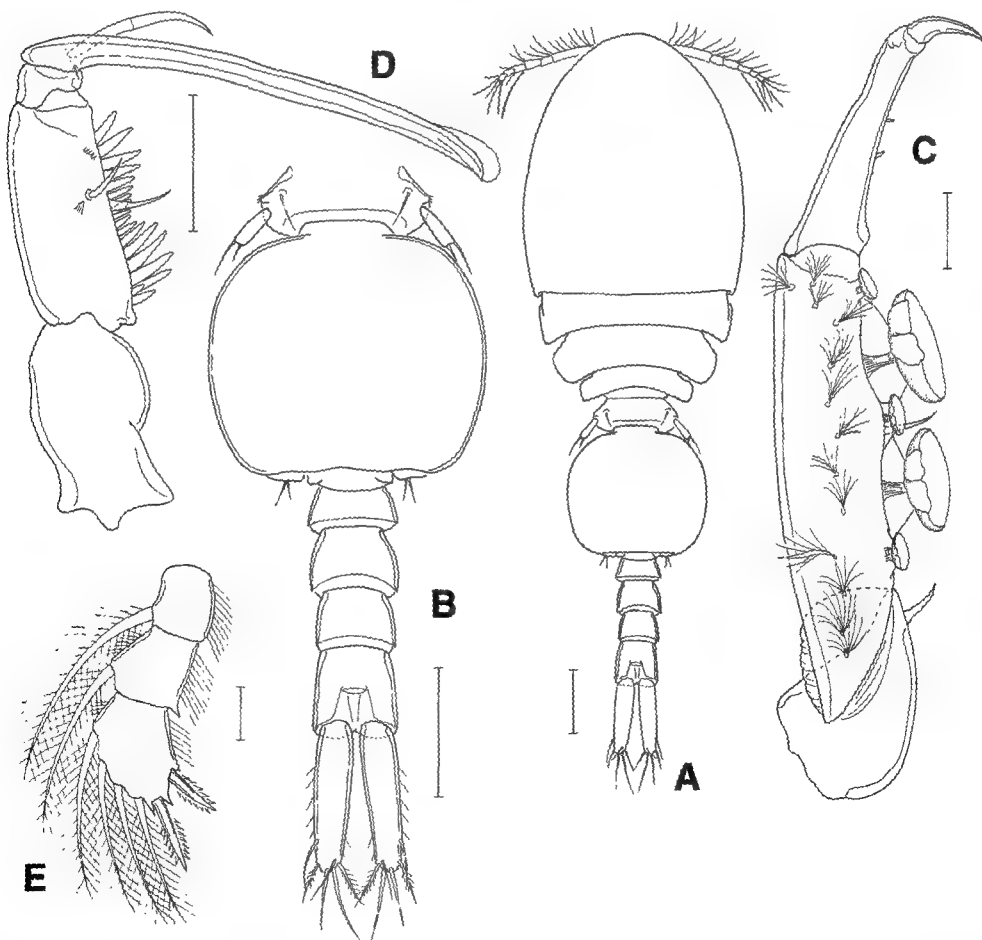


Fig. 9. *Scyphuliger vicinus* n. sp., male. A, habitus, dorsal; B, urosome, dorsal; C, antenna; D, maxilliped; E, endopod of leg 1. Scales = 0.02 mm (C, E), 0.05 mm (D), 0.1 mm (A, B).

spinules (shorter in middle of row), and 1 small process near base of distal seta. Small third segment unarmed. Claw slightly longer than segments combined, with 1 large and 1 minute seta proximally.

Legs 1-4 similar to those of female, but with sexual dimorphism in legs 1. Leg 1 (Fig. 9E) with endopod having armature formula 0-1; 0-1; 1, 1, 4. Leg 5 with small free segment of $35 \times 10 \mu\text{m}$. Leg 6 as posteroventral flap on genital somite bearing 2 small setae (Fig. 9B).

Etymology. The specific name *vicinus* ("neighboring" in Latin) alludes to the simultaneous discovery of the new species with *S. humesi* described in this report from the same host.

Remarks. In *Scyphuliger*, the dimensions of the caudal rami and free segment of leg 5 are variable depending on species. Only two species in this genus, *S. latus* Kim, 2003 and *S. pilosus* Kim, 2003, are in the range of the ratio of the length to width of the caudal ramus 3.5-4.5 : 1, like *S. vicinus*. *Scyphuliger latus* is easily distinguished from *S. vicinus* by having the genital double-somite which is wider than long, without lateral constriction and by having seven small suckers on the second segment of male antenna instead of two large and three small sucker as in *S. vicinus*.

Scyphuliger vicinus and *S. pilosus* are very alike and discovered from the same species of coral host, *Acropora squarrosa* (Ehrenberg). However, they can be distinguished from each other, because the anal somite of the female of *S. pilosus* is shorter than wide (longer than wide in *S. vicinus*), the anterior area of prosome of *S. pilosus* is ornamented with numerous villiform sensillae and hairs (smooth in *S. vicinus*), and the second segment of antenna and the first segment of maxilla of *S. vicinus* are ornamented with pinnate setules (absent in *S. pilosus*).

***Scyphuliger placidus* n. sp. (Figs. 10, 11)**

Material examined. 2 ♀♀ from *Acropora squarrosa* (Ehrenberg), in 3 m, Mermaid Cove, Lizard Island, Great Barrier Reef, Australia. 27 October 1982, collected by A. G. Humes. Holotype (♀) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. Dissected paratype (1 ♀) is retained in the collection of the author.

Female. Body (Fig. 10A) with moderately broad prosome and narrow urosome. Length 1.30 mm. Prosome $660 \times 460 \mu\text{m}$. First pedigerous somite delimited from cephalosome by faint dorsal suture line. Urosome (Fig. 10B) 5-segmented. Fifth pedigerous somite $210 \mu\text{m}$ wide, distinctly wider than genital double-somite. Genital double-somite $200 \times 145 \mu\text{m}$, with roundly expanded anterior part and gradually narrowed posterior part, without constriction or abrupt narrowing. Genital areas located dorsally. Three abdominal somites from anterior to posterior 83×90 , 77×78 , and $83 \times 71 \mu\text{m}$. First abdominal somite narrowed proximally. First abdominal and anal somite with fine sensillae on lateral margins.

Caudal ramus (Fig. 10C) $135 \times 32 \mu\text{m}$, ratio 4.22:1, with sensillae on outer lateral margin and 6 caudal setae; outer lateral and dorsal setae smooth. Longest inner one of two median terminal setae also smooth and $114 \mu\text{m}$; outermost terminal seta plumous along inner margin; other 2 setae plumous bilaterally. Egg sac not seen.

Rostrum small, tapering, with truncated posterior end (Fig. 10D). Antennule (Fig. 10E) slender and $153 \mu\text{m}$ long. Armature formula: 4, 13, 6, 3, 4+1 aesthetasc, 2+1 aesthetasc, and 7+1 aesthetasc. All setae smooth. Antenna (Fig. 10F) 3-segmented; each segment 54, 75, and $55 \mu\text{m}$ from proximal to distal. First 2 segments stocky. First segment with 1 inner distal pinnate setule in

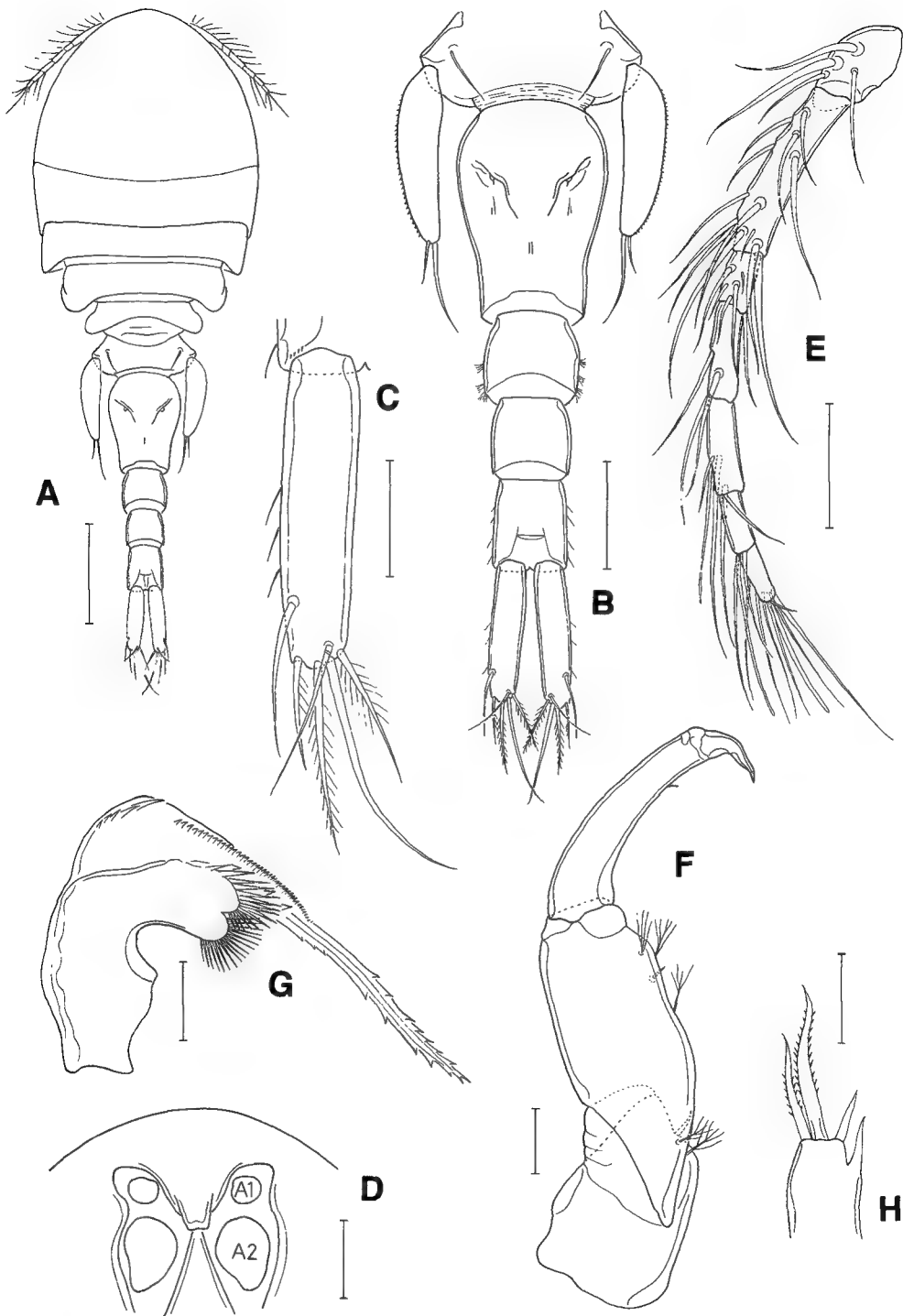


Fig. 10. *Scyphuliger placidus* n. sp., female. A, habitus, dorsal; B, urosome, dorsal; C, left caudal ramus dorsal; D, rostral area, ventral; E, antennule; F, antenna; G, mandible; H, maxillule. Scales = 0.02 mm (C, E-H), 0.05 mm (D), 0.1 mm (B), 0.2 mm (A).

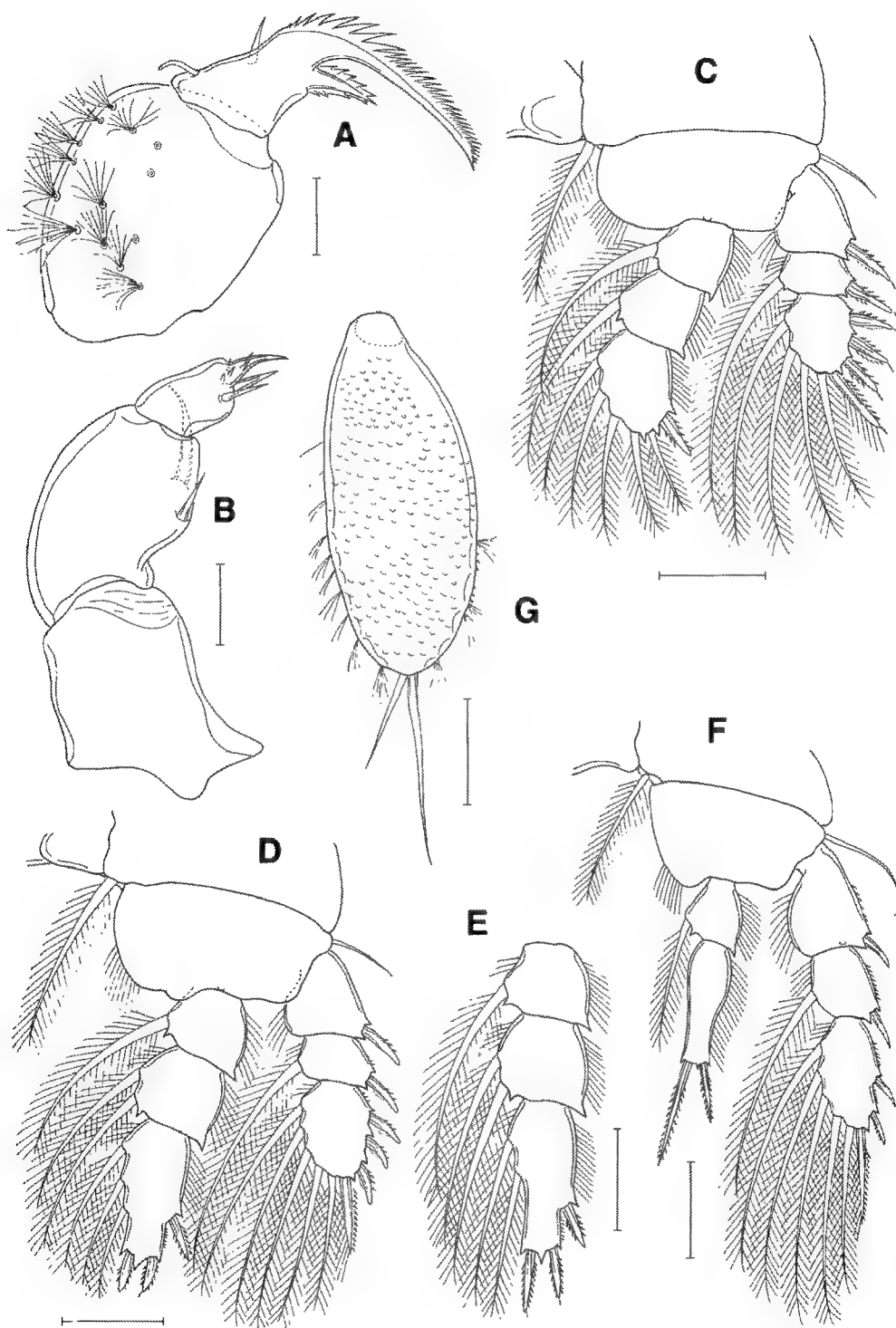


Fig. 11. *Scyphuliger placidus* n. sp., female. A, maxilla; B, maxilliped; C, leg 1; D, leg 2; E, endopod of leg 3; F, leg 4; G, free segment of leg 5. Scales = 0.02 mm (A, B), 0.05 mm (C-G).

addition to 1 seta. Second segment with 1 small seta and 4 pinnate setules on inner margin. Third segment gradually narrowed distally, with minute seta on inner margin. Claw 22 μm and waved.

Labrum with 2 posteroventral lobes. Mandible (Fig. 10G) with distinct proximal notch; inner margin bilobed, each lobe bearing tuft of long spinules; convex margin with 5 spinules and followed by small denticles; terminal lash elongate, with serrate margins. Maxillule (Fig. 10H) with 3 unequal terminal setae and 1 subterminal setiform process. Maxilla (Fig. 11A) with first segment bearing about 14 pinnate setules. Second segment having 3 setae; inner seta serrate and fused to segment; anterior seta small. Lash with fine spinules on convex margin. Maxilliped (Fig. 11B) with first segment unarmed. Second segment with 2 inner setae, distal one 25 μm and proximal one 13 μm . Third segment roughly quadrangular and terminated by acute spiniform process bearing 2 or 3 spinules on each side, distally with 1 seta and 1 spiniform seta.

Legs 1-4 with 3-segmented rami except for 2-segmented endopod of leg 4 (Fig. 11C-F). Armature formula as follows:

Leg 1: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 4; enp 0-1; 0-1; I, 5

Leg 2: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 3

Leg 3: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 2

Leg 4: coxa 0-1; basis 1-0; exp I-0; I-1; II, I, 5; enp 0-1; II

Outer seta on basis of legs 1-4 naked. Second segment of leg 4 endopod $64 \times 23 \mu\text{m}$, with terminal spines of 57 μm (inner) and 31 μm (outer).

Free segment of leg 5 (Fig. 11G) elliptical, $166 \times 37 \mu\text{m}$, ratio 2.37 : 1, with numerous granules (or scales) on surface and many pinnate setules on margins. Two terminal setae 90 μm and 48 μm , respectively. Leg 6 represented by 1 minute setae in genital area (Fig. 10B).

Male. Unknown.

Etymology. The specific name *placidus* is a Latin meaning "gentle". It alludes to the female genital double-somite having smoothly narrowed posterior part.

Remarks. Only two species in *Scyphuliger* are known to have a female genital double-somite bearing smoothly narrowed posterior part as in *S. placidus*. They are *S. manifestus* Humes, 1991 and *S. paucisurculus* Kim, 2003. In other species of the genus the somite is posteriorly constricted or abruptly narrowed. In *S. latus* Kim, 2003 the somite is wider than long.

Scyphuliger manifestus is recorded as associate of the scleractinian corals *Acropora hyacinthus* (Dana) and *A. squarrosa* (Ehrenberg) from the Great Barrier Reef (Humes, 1991). Therefore, one of its host species (*A. squarrosa*) and its distribution are shared with *S. placidus*. Nevertheless, *Scyphuliger manifestus* reveals morphological differences from *S. placidus*. In *S. manifestus* the caudal rami is 6.19 times as long as wide (4.22 times as long in *S. placidus*), the maxillule bears 3 elements (4 in *S. placidus*), and the free segment of female leg 5 is narrow near base (elliptical in *S. placidus*).

In *S. paucisurculus* the caudal ramus is 2.92 times as long as wide, the maxillule bears 3 elements, the anal somite is wider than long, and the free segment of female leg 5 is elongate. Therefore, it differs also from *S. placidus*.

Family Rhynchomolgidae Humes & Stock, 1972

Genus *Doridicola* Leydig, 1853

***Doridicola parapatulus* n. sp. (Figs. 12 and 13)**

Material examined. 3 ♀♀ from the nudibranch *Glossodoris atromarginata* (Cuvier), Pioneer Bay, Orpheus Island, Great Barrier Reef, Australia, 7 May 1974, collected by L. Zann. Holotype (♀) and paratype (1 ♀) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Dissected paratype (1 ♀) is retained in the collection of the author.

Female. Body (Fig. 12A) very broad and circular, with large prosome and stocky urosome. Length 950 µm. Cephalothorax 776×738 µm, nearly disc-shaped, with first pedigerous somite demarcated from cephalosome by dorsal suture line. Second and third pedigerous somite margined with membrane on lateral margins. Urosome (Fig. 12B) short and 5-segmented. Fifth pedigerous somite 196 µm wide. Genital double-somite expanded laterally, 146×208 µm, ratio 0.70 : 1, consisting of broader anterior part and very short, narrower posterior part. Genital areas located posterolaterally. Three abdominal somites from anterior to posterior 19×92 , 15×87 , and 29×79 µm. First 2 abdominal somites markedly short. Caudal ramus (Fig. 12C) 35×32 µm, ratio 1.09 : 1, with 6 caudal setae; 2 median terminal setae much longer than urosome. Egg sac consisting of loosely associated eggs (Fig. 12A).

Rostrum broad but its posterior margin indistinct (Fig. 12D). Antennule (Fig. 12E) slender, 390 µm, with armature formula: 4, 13, 6, 3, 4+aesthetasc, 2+aesthetasc, and 7+aesthetasc; all setae smooth. Antenna (Fig. 12F) stocky and 4-segmented, with armature formula: 1, 1, 3, and 4+2 claws. Fourth segment approximately 75×37 µm. Two terminal claws very unequal, each 50 µm and 26 µm.

Labrum (Fig. 12G) with 2 tapering posterior lobes. Mandible (Fig. 12H) with deep proximal notch. Inner margin oblique to terminal lash, with thick spinules. Convex margin defined from terminal lash by notch, with row of about 10 spinules. Terminal lash long and spinulated. Maxillule (Fig. 13A) with 1 small subterminal setiform process and 3 terminal setae, one of latter broadened. Maxilla (Fig. 13B) with broad, unarmed first segment. Second segment with 3 setae; inner seta with long spinules on distal margin and distal part of proximal margin; anterior and proximal setae bluntly ended. Lash relatively short, with distinctly large proximal spinules and extra row of several spinules on posterior surface. Maxilliped (Fig. 13C) with unarmed first segment. Second segment with 2 greatly unequal setae, larger one 35 µm and plumose, smaller one 10 µm. Third segment strongly tapering, terminated by acute process bearing 1 proximal setule, with 2 very unequal distal setae.

Legs 1-4 with 3-segmented rami except for 2-segmented endopod of leg 4 (Fig. 13D-G). Armature formula of legs 1-4 as follows:

Leg 1: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 4; enp 0-1; 0-1; I, 5

Leg 2: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 3

Leg 3: coxa 0-1; basis 1-0; exp I-0; I-1; III, I, 5; enp 0-1; 0-2; I, II, 2

Leg 4: coxa 0-1; basis 1-0; exp I-0; I-1; II, I, 5; enp 0-1; II

Outer seta on coxa of legs 1-4 smooth. Outer seta on basis of leg 4 enlarged, but inner coxal seta on this leg obscure. Second endopodal segment of leg 4 67×23 µm, its 2 terminal spines 47 µm (inner) and 23 µm (outer). Inner seta on first segment short, reaching middle of second segment.

Leg 5 with free segment (Fig. 13H) 75×20 µm, ratio 3.75 : 1, with straight lateral margins; two terminal setae large and smooth, 97 µm (inner) and 79 µm (outer). Leg 6 represented by 1 setule

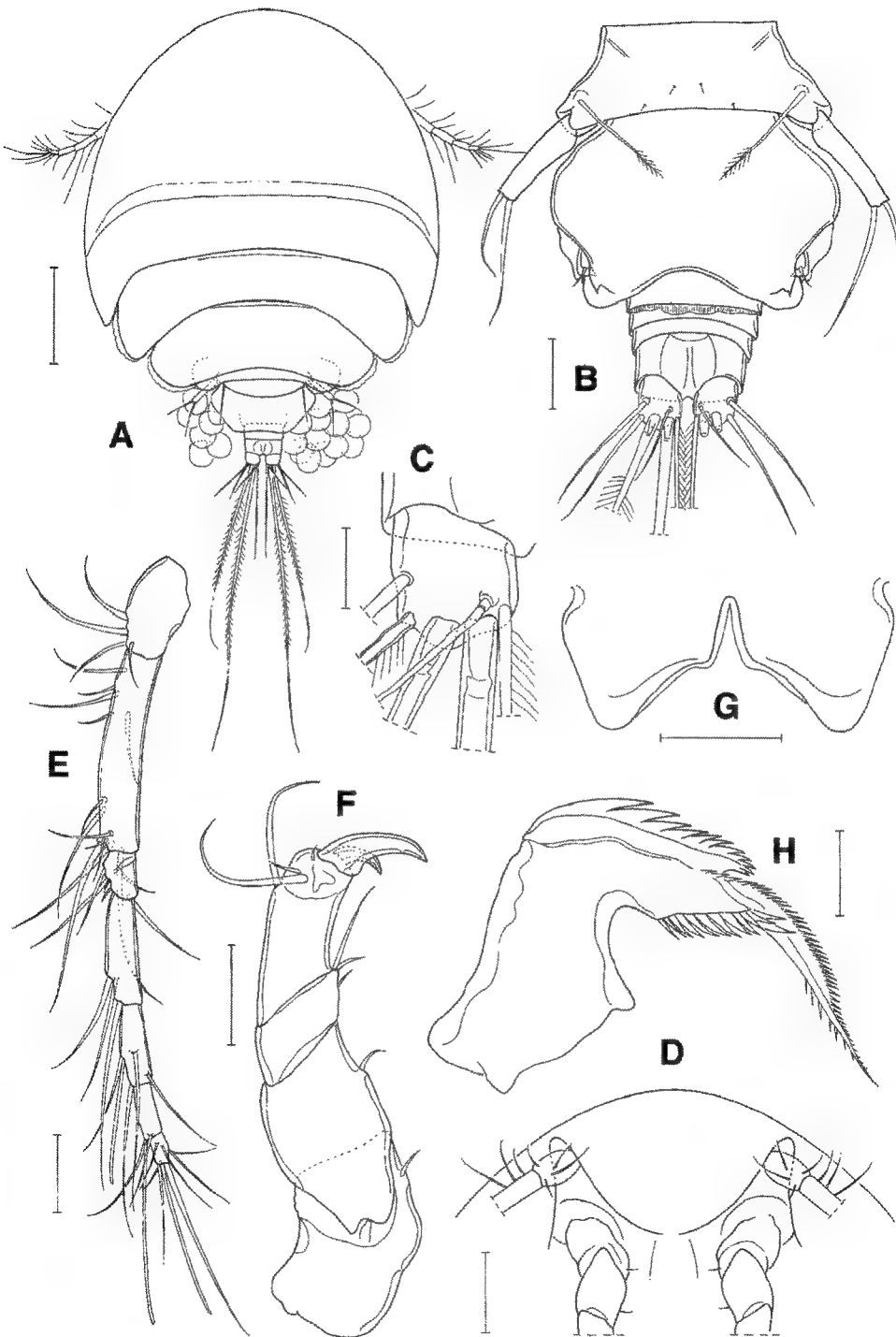


Fig. 12. *Doridicola parapatulus* n. sp., female. A, habitus, dorsal; B, urosome, dorsal; C, left caudal ramus, sal; D, rostral area, ventral; E, antennule; F, antenna; G, labrum; H, mandible. Scales = 0.02 mm (C, H), 0.1 mm (B, E-G), 0.1 mm (D), 0.2 mm (A).

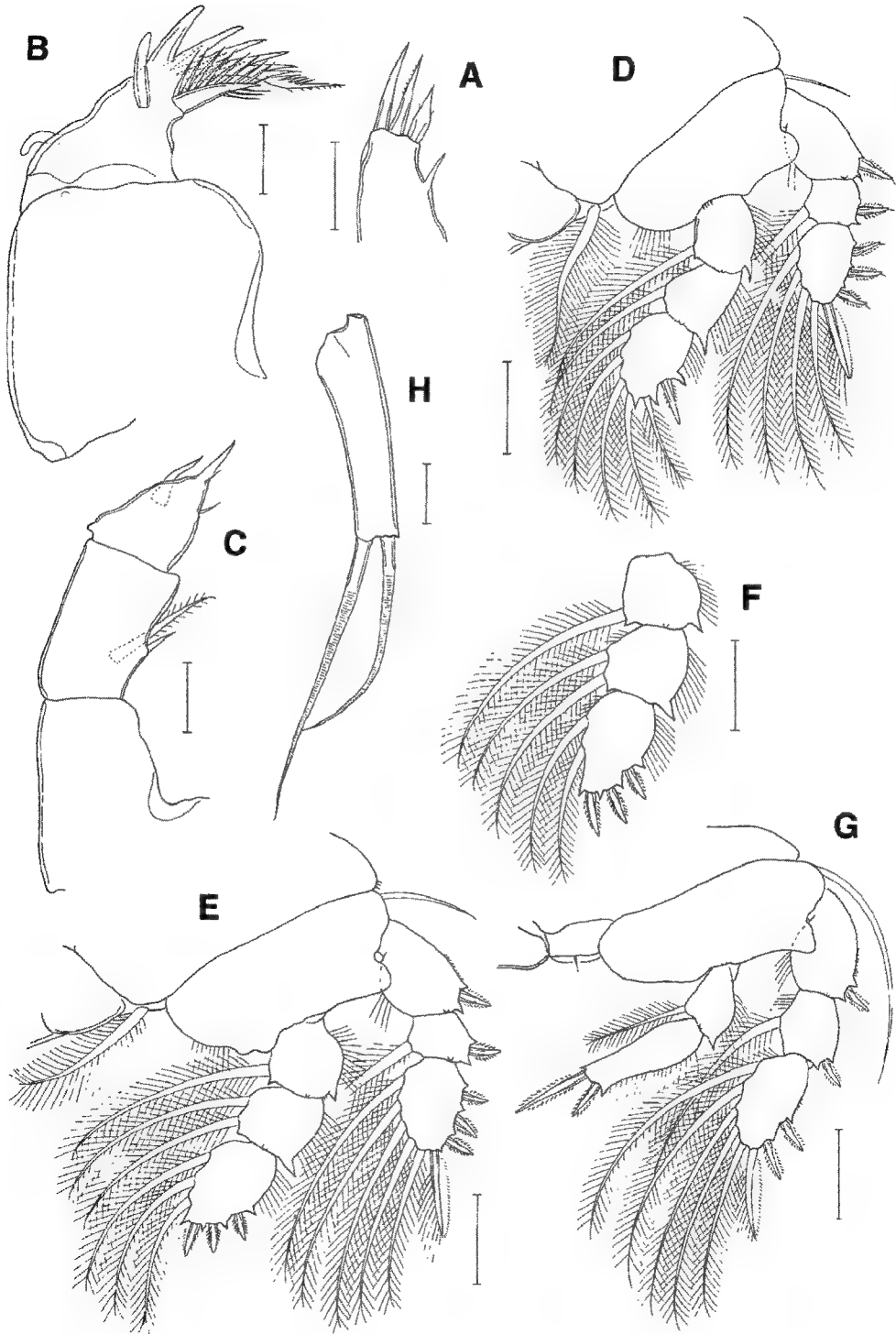


Fig. 13. *Doridicola parapatulus* n. sp., female. A, maxillule; B, maxilla; C, maxilliped; D, leg 1; E endopod of leg 3; G, leg 4; H, free segment of leg 5. Scales = 0.02 mm (A-C, H), 0.05 mm (D-G).

Table 1. Comparison of *Doridicola parapatulus* and *D. patulus*.

Characters	<i>D. parapatulus</i> n. sp.	<i>D. patulus</i> (Humes, 1959)
Length of female	0.95 mm	1.27 mm
Genital double-somite	146 × 208 μm (1 : 1.42)	151 × 324 μm (1 : 2.15)
Caudal ramus	35 × 32 μm (1.09 : 1)	36 × 42 μm (1 : 1.17)
Free segment of female leg 5	75 × 20 μm (3.75 : 1); with smooth outer margin	98 × 22 μm (4.45 : 1); with spinules on outer margin
Lengths of abdominal segments	17, 15, and 29 μm	56, 36, and 39 μm
Proximal part of lash of maxilla	with some large spines	all spines small

and 1 small spinule in genital area (Fig. 12B).

Male. Unknown.

Etymology. The specific name *parapatulus* alludes to the close resemblance with *D. patulus* (Humes, 1959).

Remarks. *Doridicola* is the largest genus in the Rhynchomolgidae. Boxshall and Halsey (2004) counted 43 species in this genus. Of these 43 species, *D. patulus* (Humes, 1959) is selected as the most close relative of *D. parapatulus* n. sp., because this species from Madagascar displays a strong resemblance to *D. parapatulus* in most important respects, especially in the almost identical appearance of the female genital double-somite. A careful comparison between the two species leads to separate them as different species. The differences are revealed in the body length, the dimensions of caudal ramus, genital double-somite and free segment of female leg 5, the lengths of abdominal segments, and the shape of maxilla (Table 1).

Family uncertain

Genus *Ruhtra* Kim, 2003

***Ruhtra germinata* n. sp. (Figs. 14 and 15)**

Material examined. 2 ♂♂ imbedded in the tissue of an unidentified alcyonacean coral, in 3 m, Orpheus Island, Palm Group, Great Barrier Reef, Australia, May 1974, collected by L. Zann. Holotype (♀) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Dissected paratype (1 ♂) is retained in the collection of the author.

Male. Body (Fig. 14A, B) vermiform and unsegmented. Length 5.83 mm. Prosome oval, dorsoventrally deeper than laterally wider, 2.75 mm long and 2.02 mm deep, without segmentation, nor constriction. Urosome (Fig. 14C) cylindrical, elongate, 3.08 mm long and 0.56 mm in maximum width, with several weak constrictions. Genital flap discernible. Caudal ramus (Fig. 14D, E) fused with urosome, tapering, approximately 300 × 170 μm, curved to ventral side; caudal setae 5 in number, variable in size and shape, terminal ones foliaceous or spatulate. Egg sac not seen.

Rostrum lacking. Antennule (Fig. 14F) broad and unsegmented, 105 μm long, armed with about 17 smooth setae. Antenna (Fig. 14G) tapering, incompletely 4-segmented, with armature formula 1, 1, 3, and 4+claw. Each segment 80, 83, 36 and 40 μm long from proximal to distal. Terminal claw 45 μm long, weakly curved.

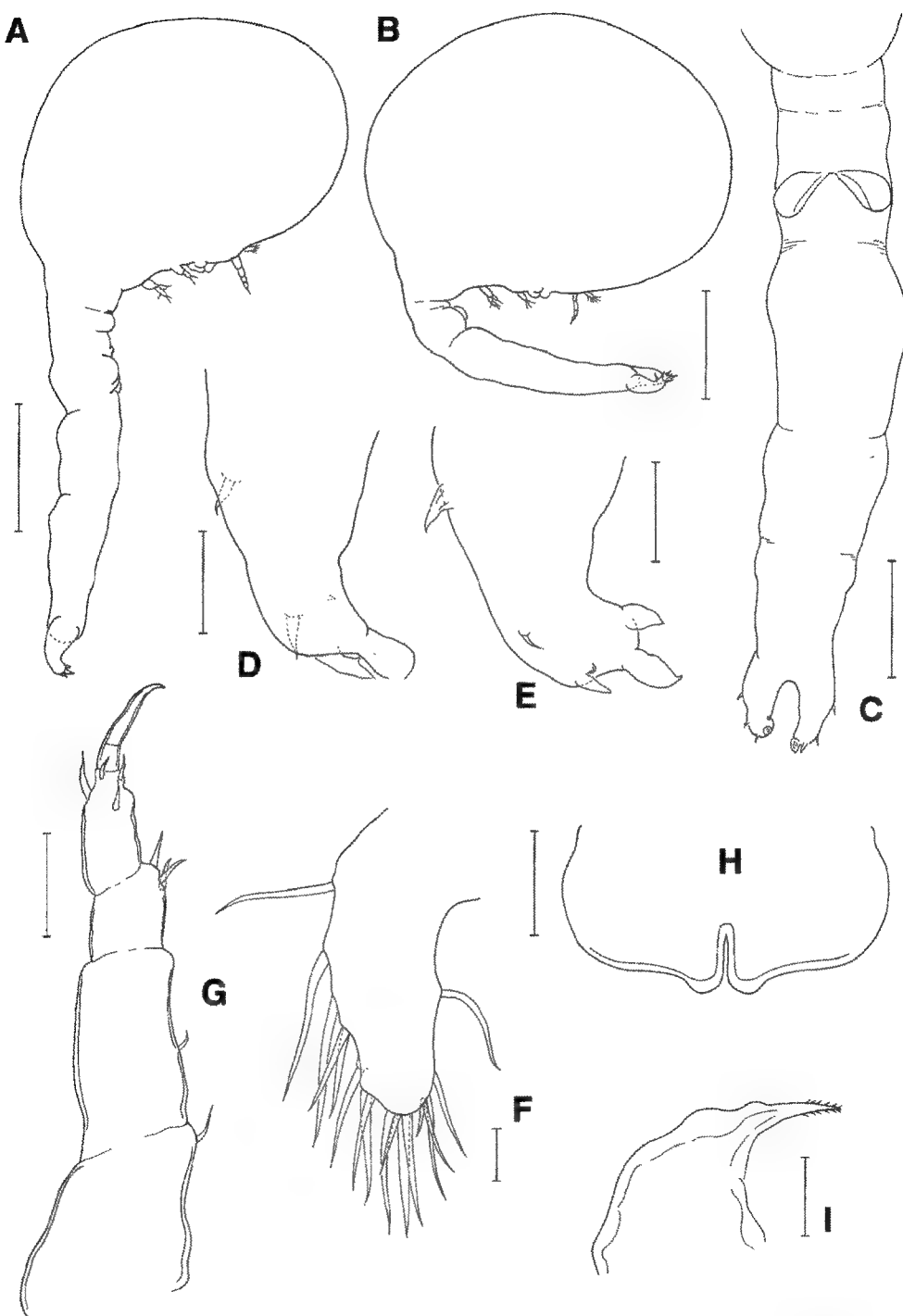


Fig. 14. *Ruhtra germinata* n. sp. male. A, habitus of paratype, lateral; B, same of holotype, lateral; C, urosome, ventral; D, E, caudal rami, lateral; F, antennule; G, antenna; H, labrum; I, mandible. Scales = 0.02 mm (F, I), 0.05 mm (G, H), 0.1 mm (D, E), 0.5 mm (C), 1 mm (A, B).

Labrum (Fig. 14H) bilobed, with shallow and narrow median incision. Mandible (Fig. 14I) strongly tapering, simple, terminated by acute process bearing spinules on both margins. Paragnath and maxillule not recognized. Maxilla (Fig. 15A) 2-segmented. First segment unarmed. Second segment armed with 2 plumose setae; lash elongate, with small spinules along convex outer margin. Maxilliped (Fig. 15B) 3-segmented. First segment $90 \times 90 \mu\text{m}$, unarmed but with patch of hairs near inner distal corner. Second segment armed with 1 seta near middle, 1 patch of hairs, and row of enlarged setules along inner margin. Terminal segment small and strongly tapering, with 2 plumose setae, and terminated by claw bearing several spinules on both sides.

Legs 1 (Fig. 15C) and 2 (Fig. 15D) with 1-segmented exopod and endopod. Both legs with outer seta on basis, but without inner coxal seta; intercoxal plate fused with protopods. Exopod of leg 1 armed with 3 small outer setae and 4 larger distal setae. Endopod with 7 setae. Exopod of leg 2

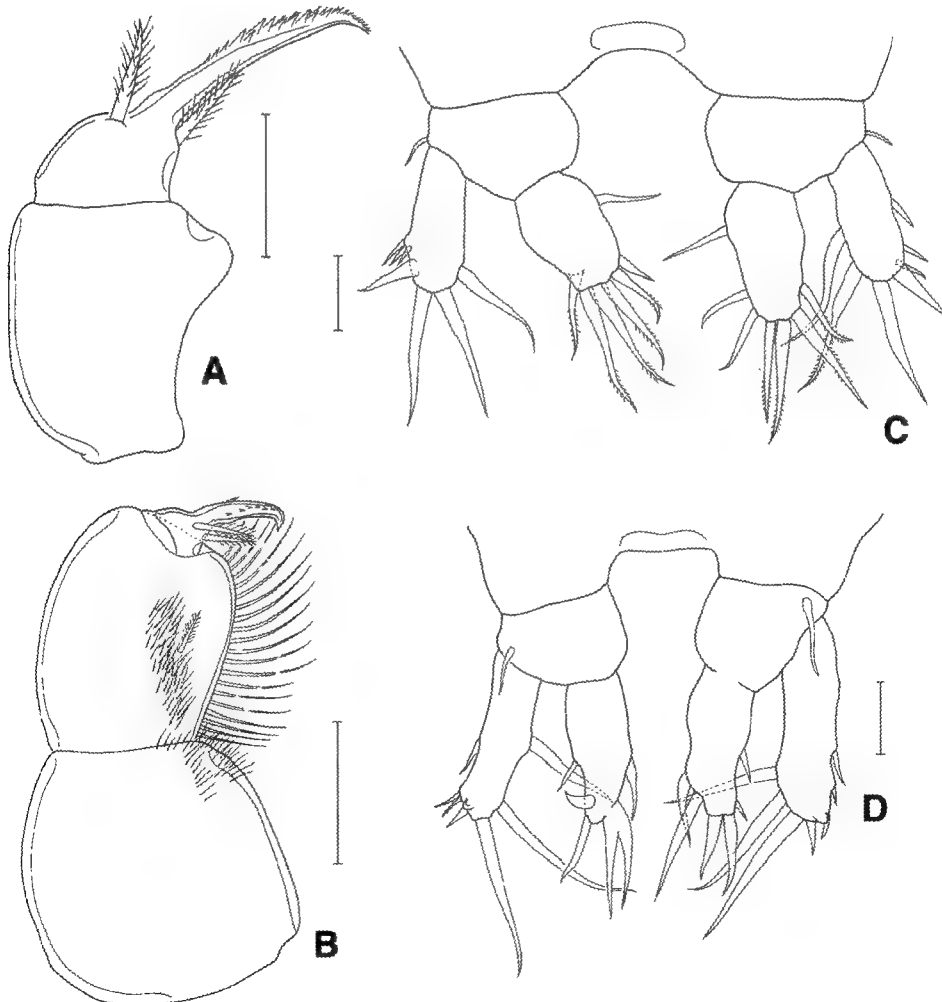


Fig. 15. *Ruhtra germinta* n. sp. male. A, maxilla; B, maxilliped; C, left and right leg 1; D, left and right leg 2. Scales = 0.05 mm (A-D).

with 4 small setae and 3 larger setae. Endopod with 2 small outer setae and 4 larger distal setae. Setae on rami of legs 1 and 2 variable in shape. Leg 3-6 absent.

Female. Unknown.

Etymology. The specific name *germinata* is a Latin meaning “germinated” or “budded”, alluding to the germ-shaped body of the species.

Remarks. The genus *Ruhtra* Kim, 2003 is known only by *R. humesi* Kim, 2003 discovered from an alcyonacean coral from New Caledonia (Kim, 2003). *Ruhtra germinata* is easily distinguishable from the type species by the expanded prosome, the shorter terminal claw of antenna, the presence of the terminal claw on maxilliped, and the 2-segmented endopod of legs 1 and 2.

The present discovery of another species of *Ruhtra* reinforces the distinctiveness of this genus. The most important feature of the two species uniting them as the members of *Ruhtra* seems to be the peculiar maxilliped in which the second segment is armed with a single seta and row of large setules along inner margin. Although only the males of *R. germinata* are available for study, their maxilliped is not different in general form from those of other lichomolgoid females, therefore, suggesting that this species also show no sexual dimorphism in this appendage, as in the type species.

Although the exopod of legs 1 and 2 of *R. germinata* are 1-segmented and, therefore, are different from 2-segmented state of *R. humesi*, the nature of their setations on both rami of legs 1 and 2 are alike between the two species: 7 elements on both rami of leg 1, and 7 on the exopod and 6 on the endopod of leg 2.

The morphological feature of the maxilliped and legs alone may characterize *Ruhtra*. However, no evidence is found yet in both species for the assignment of this genus to any known family in the lichomolgoid complex.

Order Siphonostomatoida

Family Asterocheridae Giesbrecht, 1899

Genus *Collocheres* Canu, 1893

***Collocheres oribullatus* n. sp. (Figs. 16-18)**

Material examined. 4 ♀♀, 4 ♂♂ from the crinoid *Comanthina belli* (Carpenter), in 12 m, Mermaid Cove, Lizard Island, Great Barrier Reef, Australia, 27 October 1982, collected by A. G. Humes (collected together with 13 ♀♀, 4 ♂♂ of *Glyptocheres comanthina* Humes, 1987 and 1 ♀ of *Pseudanthessius rostellatus* Humes and Ho, 1970). Holotype (♀), allotype (♂), and paratypes (2 ♀♀, 2 ♂♂) will be deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Dissected paratypes (1 ♀, 1 ♂) are retained in the collection of the author.

Female. Body (Fig. 16A) moderately slender. Length of dissected specimen 718 µm (575-718 µm). Prosoma 420 µm long, dorsoventrally deeper than laterally wider. Cephalothorax 301 × 230 µm. Urosome (Fig. 16B) 5-segmented. Fifth pedigerous somite 88 µm wide. Genital double-somite tapering, 110 × 81 µm wide, 1.36 times longer than wide, with 5 obscure serrations along lateral margins posterior to genital areas and angular posterolateral corners. Genital areas located near 1/3 length of somite. Three abdominal somites from anterior to posterior 41 × 47, 29 × 41, and 32 × 41 µm. Caudal ramus 47 × 19 µm, ratio 2.47 : 1, with 3 dentiform processes on

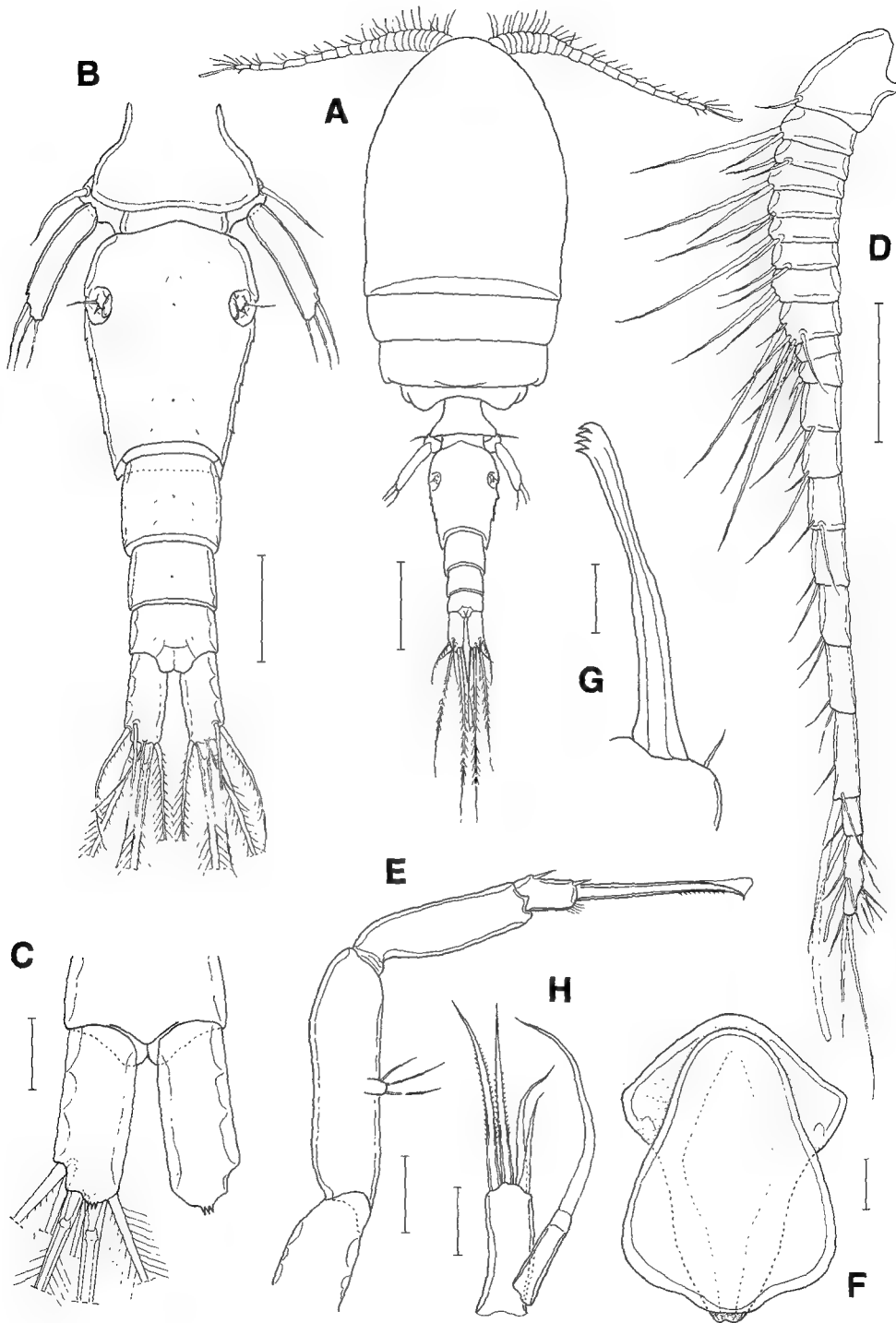


Fig. 16. *Collocheres oribullatus* n. sp., female. A, habitus, dorsal; B, urosome, dorsal; C, caudal rami, ventral; D, antennule; E, antenna; F, oral cone, ventral; G, mandible; H, maxillule. Scales = 0.02 mm (C, E-H), 0.05 mm (B, D), 0.1 mm (A).

posteroventral tip (Fig. 16C); 2 smaller dorsal ones of 6 caudal setae smooth, outermost terminal seta plumose along inner margin, other 3 setae amphilaterally plumose; longest one of these caudal setae (inner one of 2 median terminal setae) 213 μm . Egg sac not seen.

Rostrum as small conical process in lateral view. Antennule (Fig. 16D) 20-segmented, 317 μm long. Armature formula: 1, 2, 2, 2, 2; 2, 2, 2, 7, 2; 2, 2, 2, 2, 2; 2, 2, 2+aesthetasc, 2, and 10+aesthetasc. All setae smooth. Aesthetasc on 18th segment twice as long as 2 terminal segments combined. Aesthetasc on terminal segment small. Antenna (Fig. 16E) with short coxa. Basis 62 μm long. Exopod small, bearing 2 terminal and 1 lateral setae. Endopod with first segment 45 μm long and unarmed. Second segment 15 μm long, with 1 proximal and 1 minute terminal seta. Terminal claw 46 μm long, with spinules along distal part of inner margin, and spatulate hyaline tip.

Oral cone (Fig. 16F) 125 μm long, with labrum distally expanded, 87 μm wide across this expansion, and labium tapering. Mandible (Fig. 16G) distally armed with 4 teeth. Palp represented by small seta (Fig. 16G). Maxillule (Fig. 16H) bilobed; outer lobe 23 μm long, terminally with 1 large seta; inner lobe 38 μm long, with 4 terminal setae. Maxilla (Fig. 17A) 2-segmented, both segments unarmed; terminal claw with hyaline tip. Maxilliped (Fig. 17B) 5-segmented. First segment with small inner distal seta. Second segment elongate and unarmed. Third segment with 3 setae. Fourth segment distally with 1 minute, hardly visible, seta. Fifth segment with 1 terminal seta. Terminal claw with minute spinules on distal half of inner margin and spatulate hyaline tip.

Legs 1-4 (Figs. 17C-F) biramous with 3-segmented rami. Armature formula as follows:

Leg 1: coxa 0-1; basis 1-1; exp. I-1; I-1; III, 5; enp. 0-1; 0-2; 1, 2, 3

Leg 2: coxa 0-1; basis 1-0; exp. I-1; I-1; III, I, 5; enp. 0-1; 0-2; 1, 2, 3

Leg 3: coxa 0-1; basis 1-0; exp. I-1; I-1; III, I, 4; enp. 0-1; 0-2; 1, I, 3

Leg 4: coxa 0-1; basis 1-0; exp. I-1; I-1; III, I, 3; enp. 0-1; 0-2; 1, I, 2

Inner seta on basis of leg 1 transparent and small. Outer distal spiniform process on second endopod segment of legs 2 to 4 bifurcate. Outer margin of exopods of these 4 legs smooth without spinules.

Leg 5 (Fig. 17G) 2-segmented. Proximal segment with 1 outer seta; inner flap with smooth margins and angular tip. Distal segment slender, linear, $59 \times 15 \mu\text{m}$, ratio 3.93 : 1, with 1 smaller subterminal and 3 similar terminal setae. No cusp or spinule found on this segment. Leg 6 represented by 1 seta and 1 spine on genital area (Fig. 16B).

Male. Body (Fig. 18A) resembling that of female in general form. Length 602 μm . Prosoma 338 μm long. Cephalothorax $245 \times 172 \mu\text{m}$.

Urosome (Fig. 18B) 6-segmented. Fifth pedigerous somite 56 μm wide. Genital somite $75 \times 89 \mu\text{m}$, with rounded corners. Four abdominal somites from anterior to posterior 44×48 , 28×40 , 23×37 , and $21 \times 36 \mu\text{m}$. Caudal ramus $35 \times 17 \mu\text{m}$, ratio 2.06 : 1.

Rostral area like that of female. Antennule (Fig. 18C) 19-segmented, geniculate, with 18th segment bearing slender aesthetasc. Armature formula: 1, 2, 2, 2, 2; 2, 2, 2, 6, 2; 2, 2, 2, 2, 2; 2, 3, 2+aesthetasc, and 11. Antenna as in female.

Oral cone, mandible, maxillule, maxilla, maxilliped, and legs 1-4 similar to those of female. Leg 5 (Fig. 18D) with proximal segment bearing rounded inner flap. Distal segment $38 \times 9 \mu\text{m}$, ratio 4.22 : 1, 3 outer setae (proximalmost one small) and 2 distal spiniform setae bearing distal

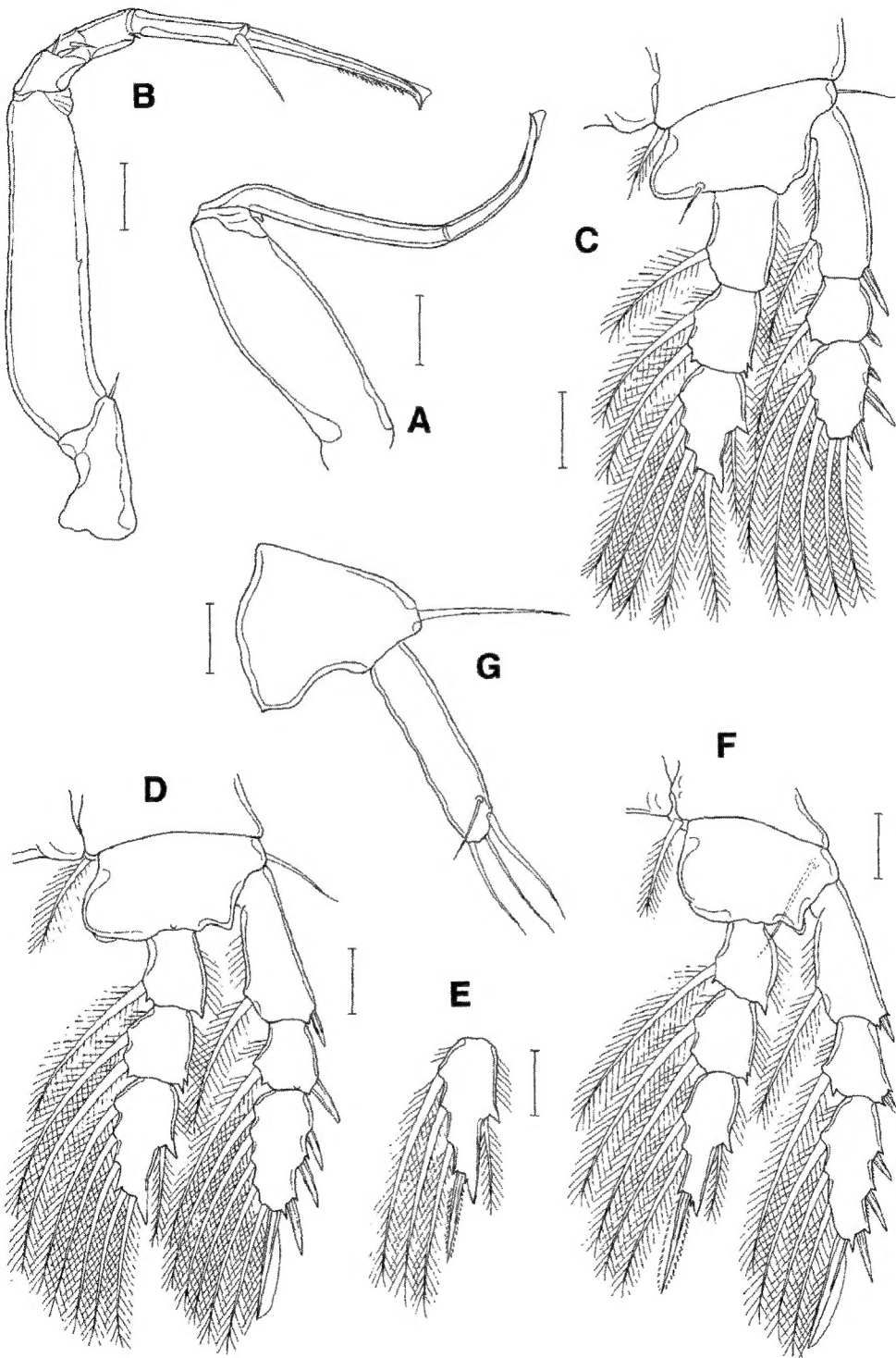


Fig. 17. *Collocheres oribullatus* n. sp., female. A, maxilla; B, maxilliped; C, leg 1; D, leg 2; E, endopodal segment of leg 3; F, leg 4; G, leg 5. Scales = 0.02 mm (A-G).

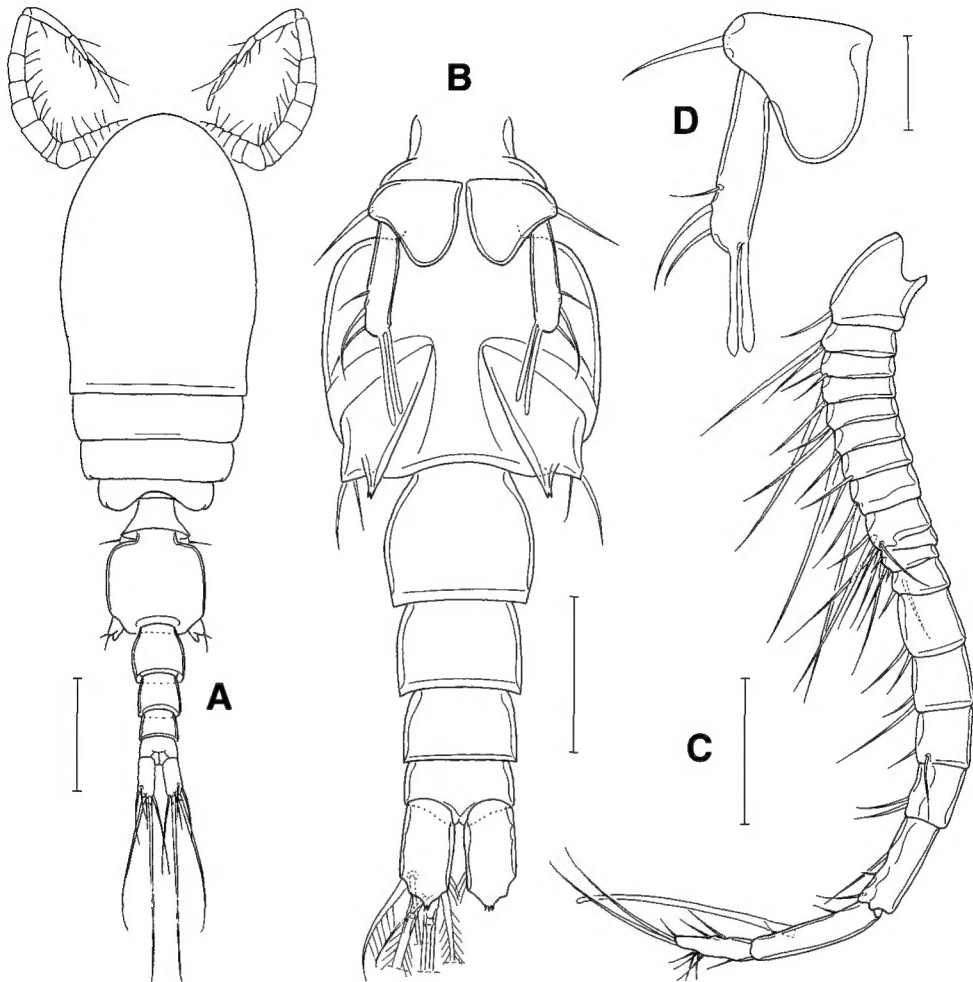


Fig. 18. *Collocheres oribullatus* n. sp., male. A, habitus, dorsal; B, urosome, ventral; C, antennule; D, leg 5. Scales = 0.02 mm (D), 0.05 mm (B, C), 0.1 mm (A).

expansion, both 23 μ m. Leg 6 represented by 2 setae and 2 processes (inner process bifurcate at tip) on posteroventral flap of genital somite (Fig. 18B).

Etymology. The specific name *oribullatus* is a combination of the Latin *oris* (mouth) and *bullatus* (inflated). It alludes to the distally inflated oral cone of the new species.

Remarks. The following eight species of *Collocheres*, those having the caudal rami shorter than three times as long as its width, are selected for a comparison with the new species.

Collocheres parvus Humes, 1987, *C. thysanotus* Humes, 1987, and *C. uncinatus* Stock, 1966 differ from the new species, because they have the outer lobe of maxillule longer than inner lobe.

Collocheres giesbrechti Thompson and Scott, 1903 has an unusual armature on the lobes of maxillule: two setae on the outer lobe and three setae on the inner lobe, a characteristics not observable in the new species and other congeners.

Collocheres marginatus Humes, 1987 has a large, membrane-bearing terminal seta on the outer lobe of maxillule, unlike the new species.

Collocheres inflatseta Humes, 1987 possesses a relatively broad distal segment of leg 5. The ratio of the length to width of this segment is 2.0:1 in the female, and 2.44:1 in the male (Humes, 1987), whereas it is 3.93:1 and 4.22:1 respectively in the new species.

Collocheres prionotus Humes, 1990 is recorded to have rhomboidal oral cone (see Fig. 9 of Humes, 1990) and to have no palp.

Collocheres titillator Humes, 1987 possesses about nine small distal teeth on the mandible and an elongate terminal seta on the outer lobe of maxillule.

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오스트레일리아 대보초의 해양 무척추동물에 공생하는 요각류 (갑각강)

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요 약

오스트레일리아의 대보초에서 채집된 무척추동물로부터 나온 요각류 7신종을 기재하였다. 이 요각류들은 석산호 *Pocillopora verrucosa* (Ellis and Solander)에 공생하는 *Panjakus bidentis*, 석산호 *Acropora squarrosa* (Ehrenberg)에 공생하는 *Scyphuliger humesi*, *S. vicinus* 및 *S. placidus*, 복족류 *Glossodoris atromarginata* (Cuvier)에 공생하는 *Doridicola parapatulus*, 바다텐드라미 일종에 공생하는 *Ruhtra germinata*, 그리고 바다나리 *Comanthina belli* (Carpenter)에 공생하는 *Collocheres oribullatus*이다.